SERVICE MANUAL

X-Y DISPLAY

COS1610

MODEL COS1611

KIKUSUI

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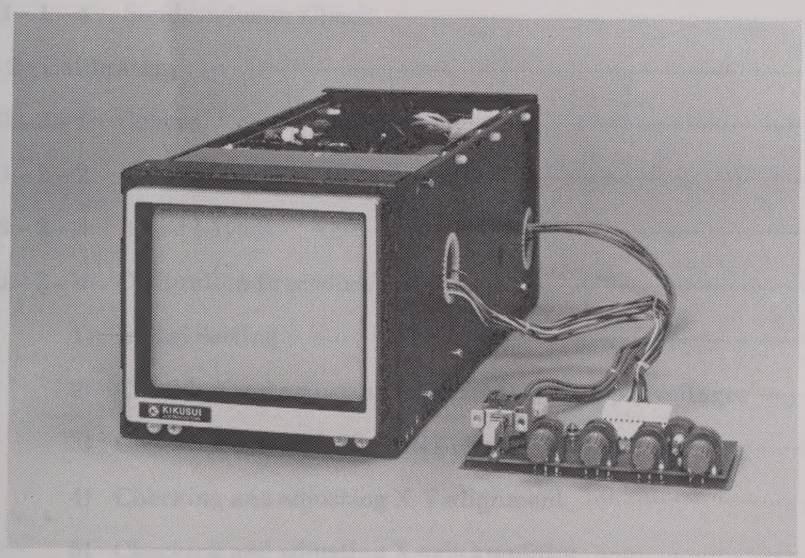

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4. TROUBLE SHOOTING 21
4–1 General 21
4–2 Block Diagram 22
4–3 Parts Location 23
4–4 Circuit Diagram 29
4–5 Exterior of components 37
4–5–1 Indication of resistance value and resistance accurary 37
4–5–2 Exterior of semiconductors and pin arrangement 38
4–6 Electrical Parts List 39
4–7 Mechanical Parts 60

1. GENERAL

Kikusui Model COS1611 X-Y Display is a wide-bandwidth display with frequency response of DC~5 MHz (−3 dB) for all of X, Y and Z axes. It employs a 6-inch rectangular domed-mesh post-acceleration CRT. The COS1610 is a compact OEM version of the COS1611. The COS1610 is without the casing and its CRT control section can be installed remotely at any required position. The outstanding features of these displays are as follows:

(1) High stability and low drift:

All stages employ differential circuitry, thereby reducing drift caused by temperature change.

(2) Linear and dynamic focus control:

Once the beam spot is adjusted to an optimal focus, this state is automatically maintained regardless of intensity change and sharp traces are displayed even at the corners of the CRT screen.

(3) High intensity CRT:

The CRT has an effective screen size of 94mm × 104mm. It a high intensity type with a high beam transmission factor and it operates on a high acceleration voltage of approximately 12kV, displaying bright and sharp traces optimal for viewing and photographing.

(4) Switching power supply:

The switching power supply circuit operates on an AC line voltage within a range of 90~264 V AC, without requiring to modify the power input circuit depending on AC line voltages unlike the conventional types of power supply circuits. This has made the display lighter and consume less power.

(5) Various optional features such as rack mount, 1/2, 1/5 or 1/10 attenuator, 50-ohm input impedance, persistent-image CRT, internal graticule, and graticule illumination are available to make the display best suit your requirements.

2. SPECIFICATIONS

The specifications of the COS1611 and those of the COS1610 are identical, except those for the mechanical sections and accessories.

(1) Horizontal (X) Axis and Vertical (Y) Axis

Item	Specification	Remarks
Deflection Sensitivity	80~200 mV/DIN (Adjustable with front panel control)	1/2,1/5, or 1/10 attenuator optional
Frequency Bandwidth	DC~5 MHz (within −3dB)	50kHz with reference to 5 DIV
Rise Time	70 ns or faster	
Setting Time	Settled within 5 μs to final spot location	
Linearity	5% or better	For 2-DIV deflection at any point on CRT
Phase Shift	Not greater than 3 degrees (up to 1 MHz)	
Input Impedance	1 MΩ ±2%, approx. 45pF	50-ohm input optional
Allowable Input Voltage	±50 V (DC + AC peak) (AC frequency not higher than 1 kHz)	When in 50-ohm input: ±3.5 V (DC+ Ac peak)
Dynamic Range	±10 DIV or more from center of CRT	
Crosstalk	Not greater than 0.05 V	When one input is 50-ohm terminated and 1 Vp-p (500 kHz) is applied to the other input
Drift	Not greater than 0.1DIV/hour	After 15 minutes of warm-up time

(2) Z Axis

Item	Specification	Remarks
Input Sensitivity	0.5~2 V (positive polarity for brighter trace) Set at maximum sensitivety when shipped	1/2,1/5, or 1/10 attenuator optional
Frequency Bandwidth	DC~5 MHz	
Rise Time	70 ns or faster	
Input Impedance	1 MΩ ±2%, approx. 45pF	50-ohm input optional
Allowable Input Voltage	±50V (DC + AC peak) (AC frequency not higher than 1 kHz)	When in 50-ohm termination: ±3.5V (DC + AC peak)

(3) CRT

Item	Specification	Remarks
Type	6-inch rectangular, flat type	
Effective Screen Size	82mm ×102mm (3.23 in. ×4.02 in.)	
Phosphor	P31	P7 optional
Acceleration Voltage	Approx. 12kV	
Beam Spot Size	0.45mm with beam current 0.5μA	At center of screen
Graticule (External graticule standard)	8DIV ×10DIV	Internal graticule optional

(4) AC Line Requirements

Item	Specification	Remarks
Operable Voltage Range	90~264V	
Frequency	50 or 60 Hz	
Power Consumption	Approx. VA	

(5) Mechanical Specifications

○ COS1611

Item	Specification	Remarks
Dimensions of Casing	174W×133H×370D (mm) (6.85W×5.24H×14.57 D in.)	
Dimensions Including Extrusions	176 W × 149 H × 400 D (mm) (6.93 W×5.87 H ×15.75D in.)	
Weight	Approx. 5.6kg (12.3 lbs)	

○ COS1610

Item	Specification	Remarks
Dimensions of Mainframe	134W×123H×363 D (mm) (5.28W×4.84 H×14.29 D in.)	
Dimensions Including Extrusions	138W×123 H×390 D (mm) (5.47W×4.84 H×15.35 D in.)	
Weight	Approx. 3.6kg (7.9 lbs)	

(6) Ambient Temperature and Humidity

To satisfy specifications: 0 to 40°C (32 to 104°F),90% RH

Maximum operable range: −10 to 45°C (14 to 113°F), 95% RH

(7) Accessories

Power cord ..... 1 Fuse 0.5A(S.B) 1

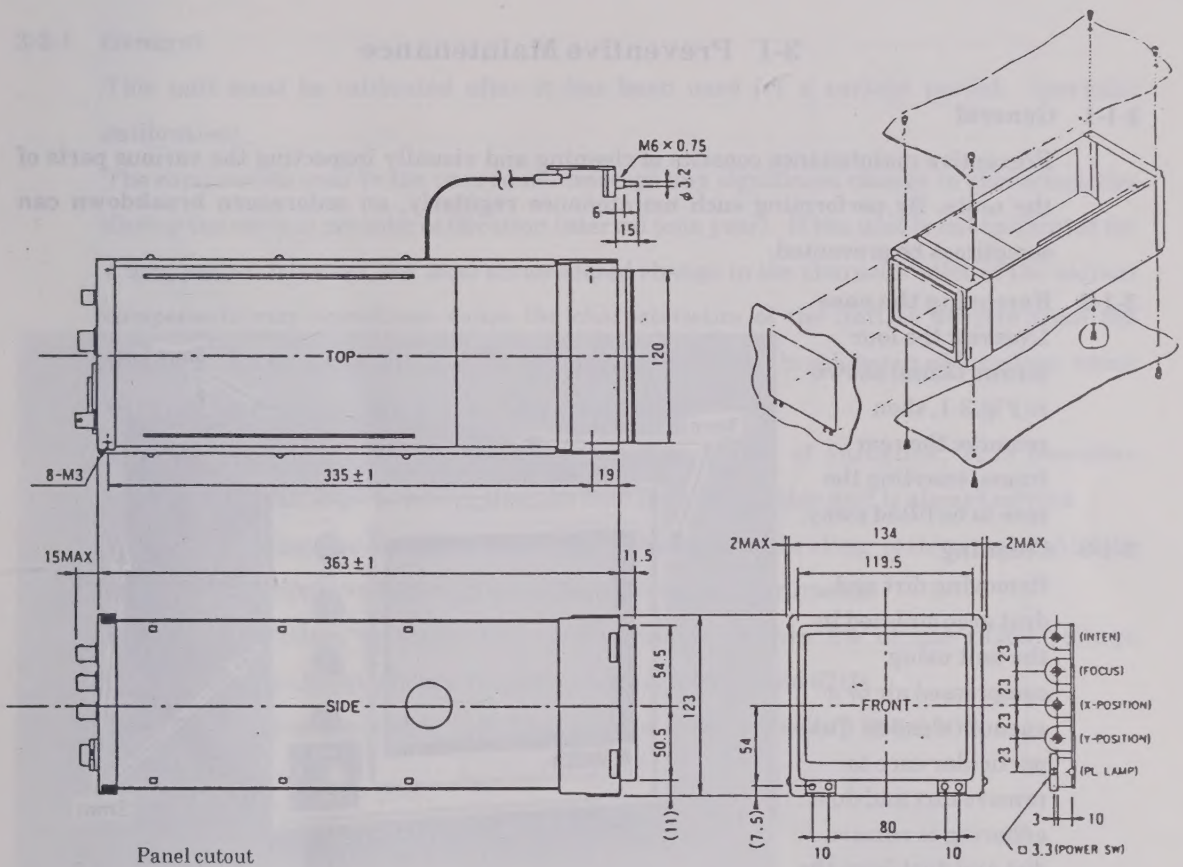
Instruction manual 1

The following items are supplied for the COS1610 only:

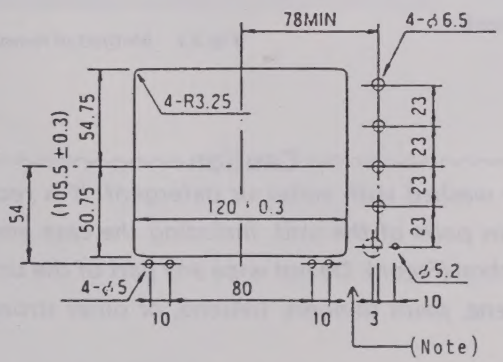
CRT control knobs ..... 4 CRT control nuts 4

CRT control washers ... 4 Hex wrench for knobs 1

(8) Instrument Dimensions and Panel Cutout Dimensions (Reference Drawing) for COS1610.



Panel cutout Dimensions (Reference Drawing)



Note: Differs by the shape of the power witch botton

3. MAINTENANCE

3-1 Preventive Maintenance

3-1-1 General

Preventive maintenance consists of cleaning and visually inspecting the various parts of the units. By performing such maintenance regularly, an unforeseen breakdown can sometimes be prevented.

3-1-2 Removing the case

Unscrew the four screws (3mm) shown in Fig.3-1, then remorve the rear frame, enavling the case to be lifted away.

3-1-3 Cleaning

Removing dirt and dust accumulated in the unit using compressed air or a vacuum cleaner. Take particular care to remove dirt and dust adhering to remove dirt and dust from the heat sink to prevent any reduction in heat dissipation.

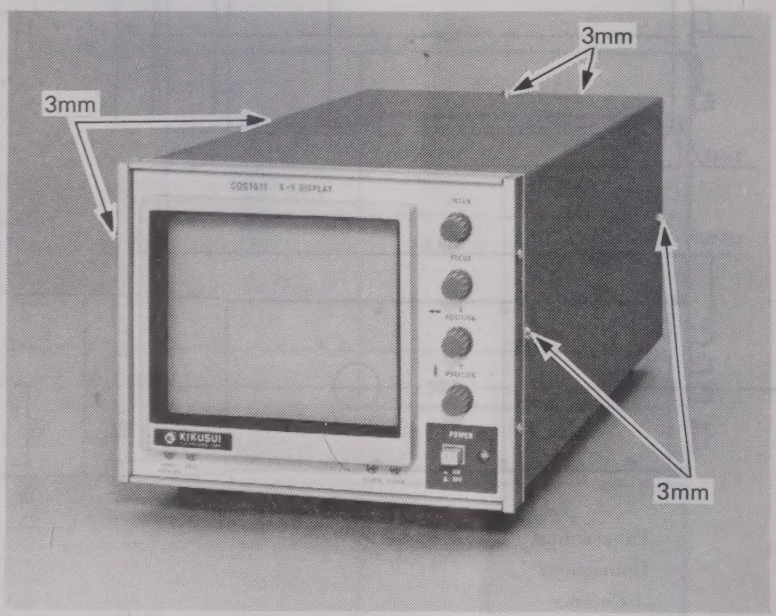


Fig.3.1 *Method of removing the case*

Caution

This unit must not be washed with water or detergent. It is recommended that dirt adhering to the various parts of the unit, including the case and panel, be removed using chlorophloro carbon (Freon). Do not wipe any part of the unit, including the case and panel, with benzene, paint thinners, toluene, or other strongly volatile or active reagent.

3-1-4 Semiconductor check

It is not recommended that transistors or other semiconductors in this unit be checked periodically.

The best way of telling whether or not the semiconductors are satisfactory is by observing whether or not the unit operates correctly.

3-2 Calibration

3-2-1 General

This unit must be calibrated after it has been used for a certain period. (periodic calibration)

The components used in the unit do not undergo any significant change in characteristics during the normal periodic calibration interval (one year). If the unit is not calibrated for a long period, however, the total accumulated change in the characteristics of the various components may sometimes cause the characteristics of the unit to deviate from the standard. By carrying out periodic calibration, defects or breakdowns of functions which were not previously used can sometimes be detected.

This unit is a measuring instrument hence it is a kind of yardstick. It is therefore necessary to take steps to ensure that the data provided by this unit is always correct.

When calibrating the unit, use correctly calibrated calibrating instruments. Also,be careful of the supply voltage applied to the calibrating instruments.

During calibration, maintain the supply voltage within 2% of the rated voltage (100v,115v 215v,230v), and the frequency between 48 Hz and 62Hz.

Keep the temperature within 25◦C ± 5◦C and the humidity within 60% ± 10%.

3-2-2 Table of calibrating instruments

The measuring instruments that are necessary for calibrating this unit are shown below.

Measuring instrument	Performance		Remarks
DC voltmeter (1) (low voltage)	Measuring range: 0 to 500V Measuring accuracy: within ±0.1%		Checking internal power supply voltages Kikusui DME 1400
DC voltmeter (2) (high voltage)	Measuring range: 0 to 10 kV Measuring accuracy: within ±1%		Checking accelerator voltage Kikusui 149-10A
Vertical axis calibrator	Amplitude compensation	Output voltage: 1mV to 50V p-p Output accuracy: ±0.3% max	Vertical axis and X-Y amplitude calibration Square wave Approx. 1 kHz
	Calibration of squarewave definition	Output waveform: Square wave Frequency: 10Hz to 1MHz Rise time: 10 ns max Flatness: Within ±0.5%	Square wave flatness adjustment
Signal generator	Frequency range: 250 kHz to 100MHz Output voltage: 5mV to 5.5Vp-p Output flatness: Within ±2%		Vertical axis and X-Y frequency calibration 50 kHz reference
Oscilloscope	Frequency band: DC to 100 MHz Sensitivity: 5mV to 5V/DIV Sweep speed: 20ms to 0.5s/DIV		Provided with sweep signal output Kikusui COS 6100A
Connecting cables	Characteristic impedance: 50 ohms;		Length Approx 1m (several cables)

Table 3-1 *Necessary instruments for calibrationn*

3-2-3 Board layout

The printed circuit boards used in this unit are shown in Table 3-2, and their layout is shown in Fig. 3-2.

Name of printed circuit board	Remarks
A1 X-Y AXIS AMP	
A2 Z AMP A & H.V	
A3 POWER SUPPLY	
A4 CRT CONTROL	
A5 SUB CONTROL	Bottom of CRT
A6 H.V UNIT	Mounted of A2

Table 3-2 *Printed circuit baards*

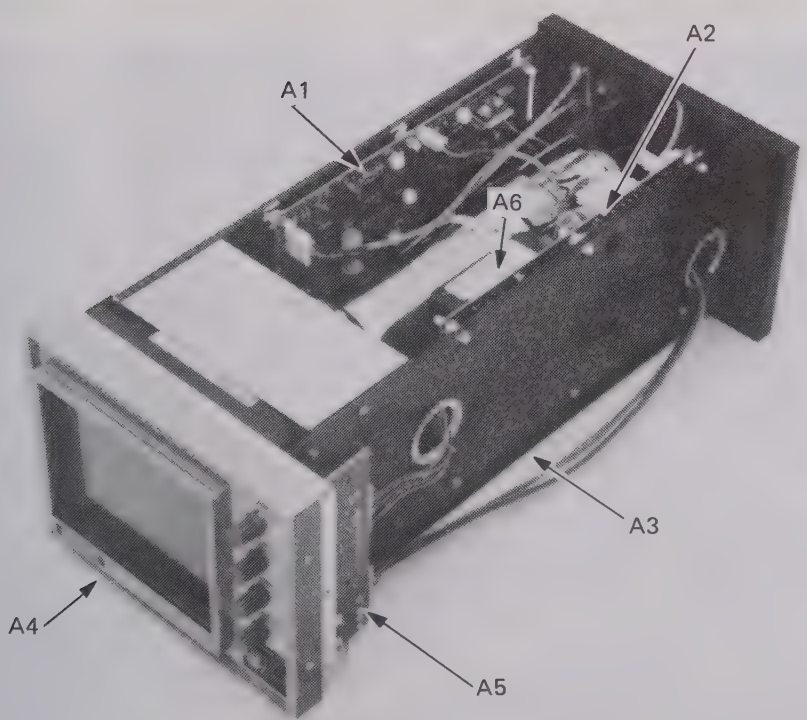


Fig.3-2 *Layout of printed ciucuit boards*

3-2-4 Calibration procedure

This unit must be calibrated correctly in the same sequence as when it was initially calibrated at the factory. The calibration procedure is set out in this manual so that the unit can be calibrated accurately and in as short a period as possible. Be sure, therefore, to observe this procedure. If it is not necessary to calibrate the entire unit but only part of it, calibration can be performed from the desired step. Before starting calibration, however, be sure to complete step (1) checking and adjusting internal voltages, and step (2) checking and adjusting CRT circuit.

1) Initial setting

Set the knobs and switches on the panel of the unit as shown in Table 3-3.

	Function	Setting	Remarks
Power	Power	ON	
CRT	INTEN	Set to best focus	Position between 2~3 o'clock point
	FOCUS	Adequate brightness	
Vertical axis	V Position	Center	
Horizontal axis	H Position	Center	

Table 3-3 *Initial settings*

2) Checking and adjusting internal power supply voltages

Table 3-4 shows each power supply voltage used in this unit together with the voltage range. Also, Figs. 3-3 and 3-4 show the checking positions for the respective power supply voltages.

If the power supply voltages are outside of the ranges shown in Table 3-4, adjust +12 V ADJ (RV531) on board A3.

Caution

If the internal power supply voltages are adjusted, the deflection factor of the CRT and also the DC balance of each amplifier will be affected. After adjusting these voltages, therefore, be sure to check these items.

DC power supply	Voltage range	Adjustment position	Remarks
+12V	+11.9V ~+12.1V	RV531	See Fig. 3-3
−12V	−11.8V ~+12.2V	—	See Fig. 3-3
+17V	+16.5V ~+17.5V	—	See Fig. 3-3
+140V	+136V ~+154V	—	See Fig. 3-3
−1750V	−1650V ~−1850V	—	See Fig. 3-4

Table 3-4 *Power supply voltages*

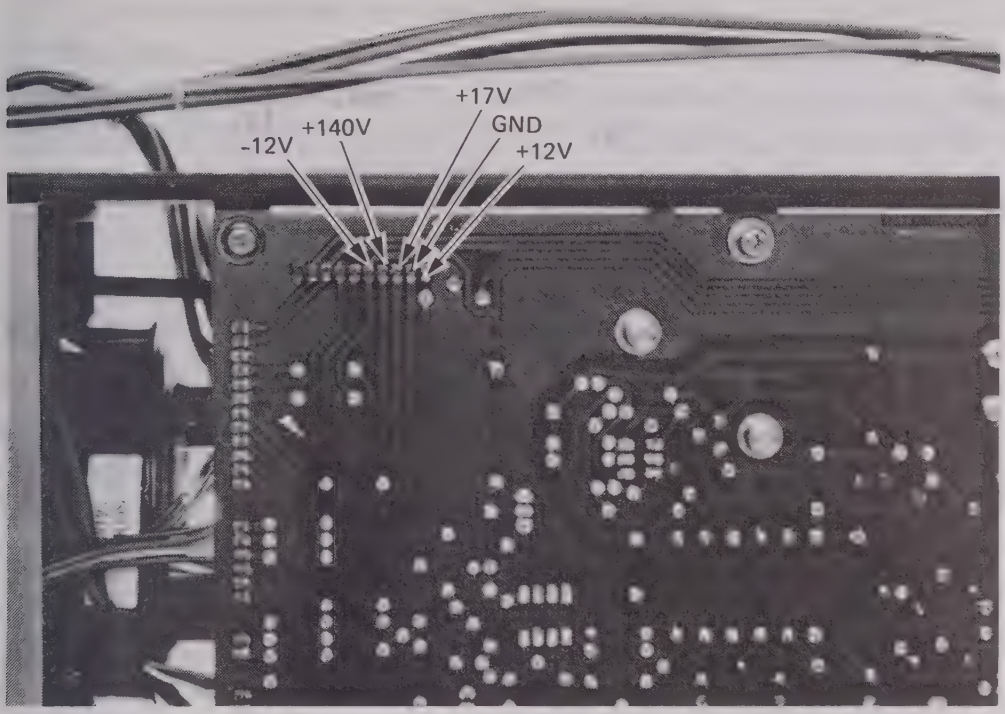


Fig. 3-3 *Power supply voltage adjusting and checking positions*

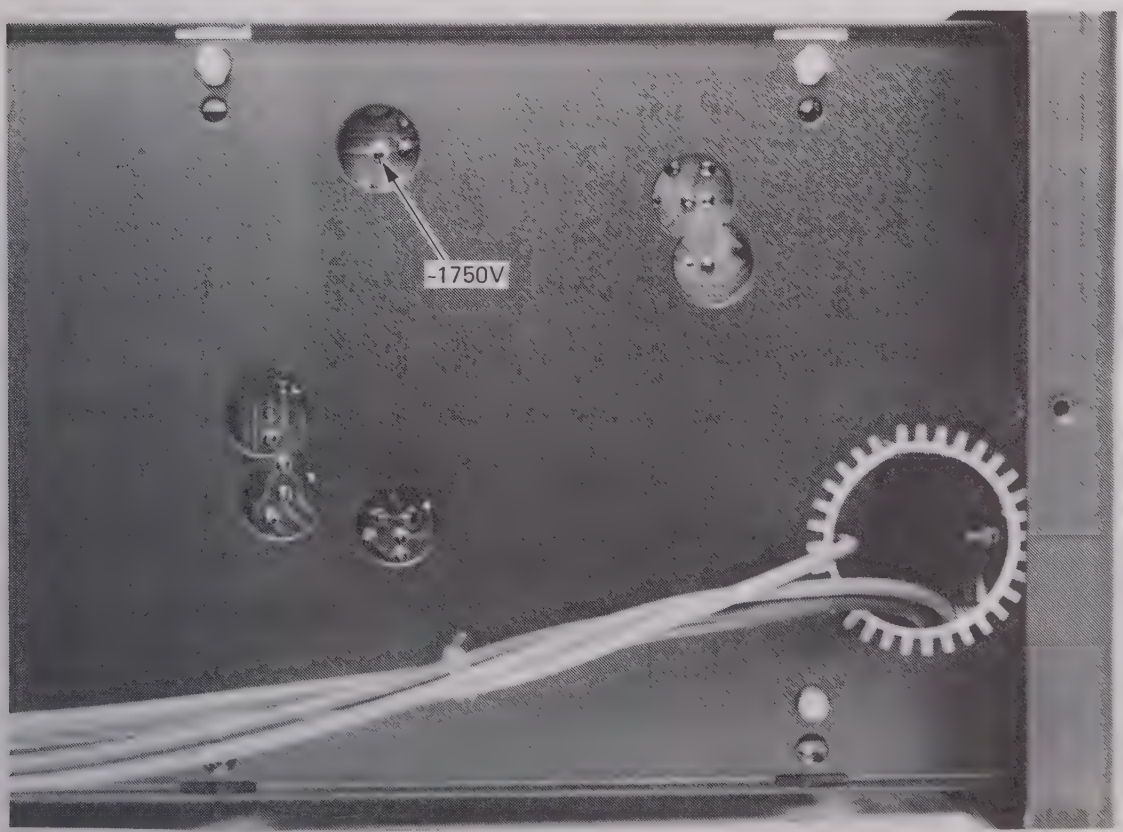


Fig. 3-4 *– 1750V checking position*

3) Checking and adjusting CRT circuit

Caution

If the voltages in the CRT circuit are adjusted in the same way as described in the previous sub-section "Checking and adjusting internal power supply voltages", the deflection factor of the CRT will be affected. After adjusting these voltages, therefore, be sure to check the vertical deflection factor and the sweep time.

a) Checking and adjusting GEOMETRY

① Perform initial setting of the unit in accordance with Table 3-3.

② As shown in Fig. 3-5, connect a DC voltmeter between pin 1 of connector P431 on board A2 and the chassis, and confirm that the voltage between these points is 61.0V ± 2.0V. If it is not, adjust GEOMETRY(RV431) on board A2 shown in Fig.3-5.

b) Checking and adjusting ASTIG.

① Perform initial setting of the unit in accordance with Table3-3.

② Rotate the "FOCUS" knob fully left and right, and confirm that the bright spot can be made to approach a circle at both maximum positions. If the bright spot does not approach a circle, adjust ASTIG (RV702) on board A5 at the bottom of the panel.

c) Checking and adjusting SUB FOCUS

Set the white dot on "FOCUS" to the 12 O'clock position, and confirm that the electron beam is correctly focused. If it cannot be correctly focused when the white dot is set to the 12 O'Clock position, adjust SUB FOCUS (RV411) on board A2 shown in Fig. 3-5.

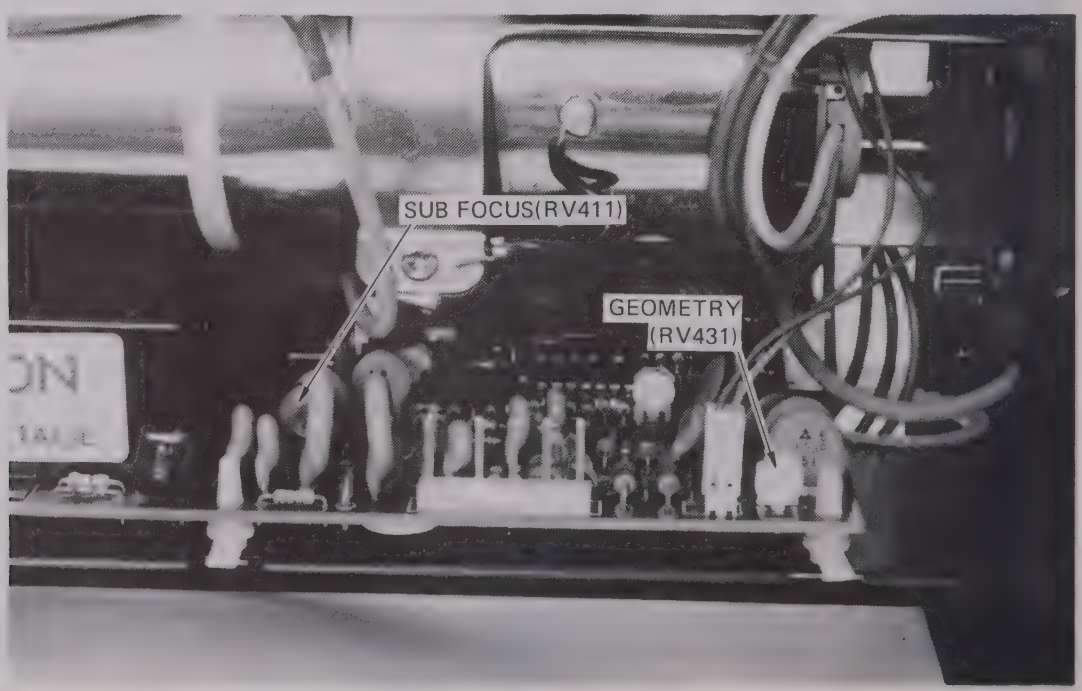


Fig. 3-5 *Adjustmint position of GEOMETRY (RV431) and SUB FOCUS (RV411)*

4) Checking and adjusting X-Y alignment

① Perform initial setting of the unit in accordance with Table 3-3.

② Connect the amplitude calibrating signal output from a vertical axis calibrator set to 50kHz, to the Y axis input.

③ Confirm that the bright line on the CRT screen is parallel to or exactly in line with the scale (center) in the vertical direction. If it is not, accurately adjust it using TRACE ROTATION.

④ Connect the signal output to the X axis.

⑤ Confirm that the bright line on the CRT screen is parallel to or exactly in line with the scale (center) in the horizontal direction. If it is not, accurately adjust it using X-Y ALIGNMENT (RV102) on board A1 shown in Fig. 3-6.

5) Checking and adjusting X axis amplifier

a) Checking and adjusting sensitivity

① Perform initial setting of the unit in accordance with Table 3-3.

② Turn "X-GAIN" on the panel fully clockwise (maximum gain).

③ Connect the amplitude calibrating signal output from a vertical axis calibrator (unterminated) set to 0.5V p-p, to the X axis input. Confirm that the length of the bright line on the CRT screen is 7DIV±0.5DIV. If it is not, adjust X-GAIN CAL (RV101) on board A1 shown in Fig. 3-6.

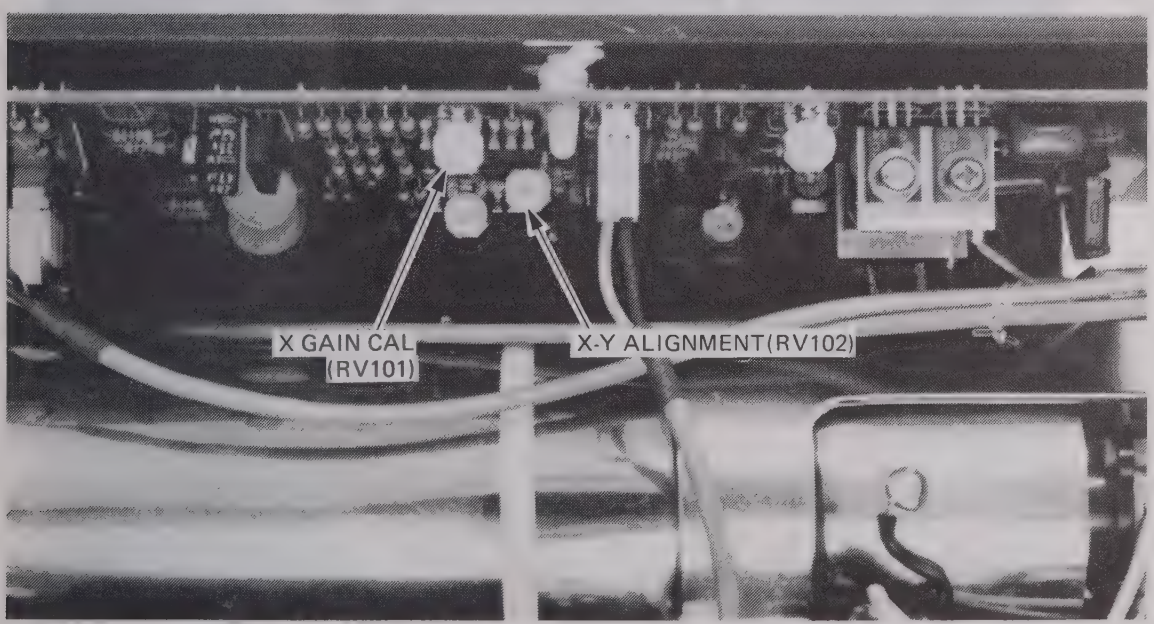


Fig. 3-6 *Adjustment position of X-Y ALIGNMENT (RV102) and X-GAIN CAL (RV101)*

b) Checking and adjusting square wave definition

① Perform initial setting of the unit in accordance with Table 3-3.

② Connect a square wave definition calibrating signal output (terminated in 50 ohms) from a vertical axis calibrator set to approx. 1MHz, to the X axis input terminal, and adjust the signal output so that the amplitude of the waveform on the CRT screen becomes 5 DIV.

③ Obtain an oscilloscope provided with a sweep output (SWEEP OUT), and connect a trigger output which is synchronized with the square wave definition calibrating signal (or the branched output from the square wave definition calibrating signal) to the vertical axis input of the oscilloscope.

④ Input the sweep output (SWEEP OUT) of the oscilloscope to the Y axis input terminal of the unit.

⑤ Adjust the trigger section of the oscilloscope so that a sweep output (SWEEP OUT) which is synchronized with the square wave definition calibrating signal is obtained.

⑥ Adjust the sweep speed (TIME/DIV) of the oscilloscope so that the waveform on the CRT screen is suitable for adjusting the square wave.

⑦ Confirm that the square wave definition of the waveform on the CRT screen is as shown in (B) of Fig. 3-7. If it is like (A) or (C), adjust X-COMP (RV103, C103) on board A1 shown in Fig. 3-8 so that the flattest characteristics are obtained.

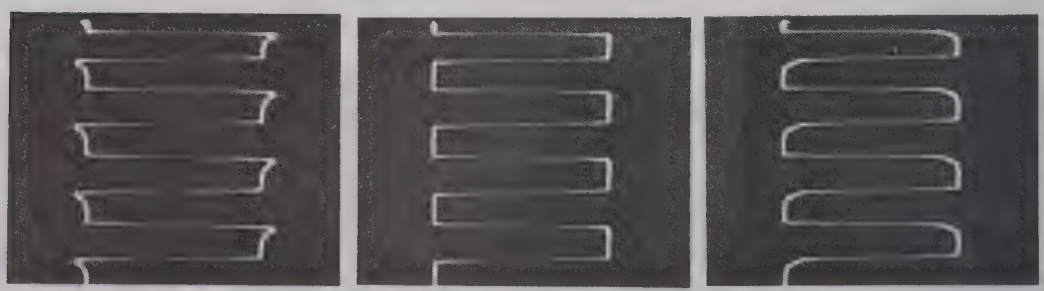


Fig. 3-7 *Adjusting square wave definition*

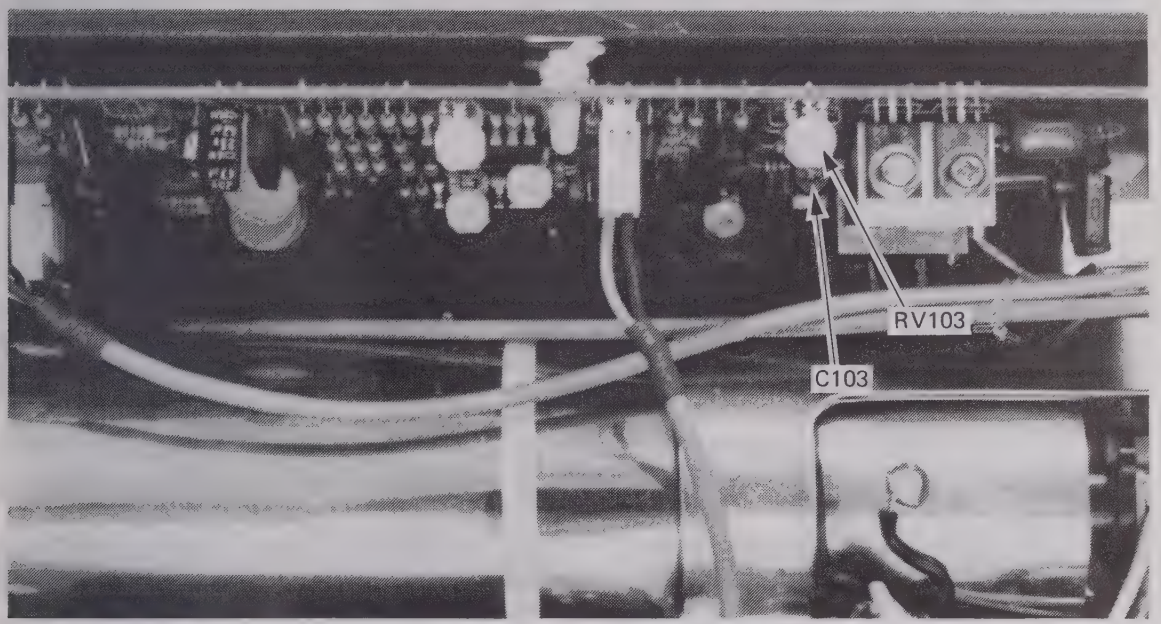


Fig. 3-8 *Adjustment position of X-COMP (RV103, C103)*

6) Checking and adjusting Y axis amplifier

a) Checking and adjusting sensitivity

① Perform initial setting of the unit in accordance with Table 3-3.

② Turn "Y-GAIN" on the panel fully clockwise (maximum gain).

③ Connect the amplitude calibrating signal output from a vertical axis calibrator (unterminated) set to 0.5Vp-p to the Y axis input. Confirm that the length of the bright line on the CRT screen is 7DIV ± 0.5 DIV. If it is not, adjust Y-GAIN CAL (RV201) on board A1 shown in Fig. 3-10.

b) Checking and adjusting square wave definition

① Perform initial setting of the unit in accordance with Table 3-3.

② Connect a square wave definition calibrating signal output (terminated in 50 ohms) from a vertical axis calibrator set to approx. 1 MHz , to the Y axis input terminal, and adjust the signal output so that the amplitude of the waveform on the CRT screen becomes 5 DIV.

③ Obtain an oscilloscope provided with a sweep output (SWEEP OUT), and connect a trigger output which is synchronized with the square wave definition calibrating signal (or the branched output from the square wave definition calibrating signal)to the vertical axis input of the oscilloscope.

④ Input the sweep output (SWEEP OUT) of the oscilloscope to the X axis input terminal of this unit.

⑤ Adjust the trigger section of the unit so that a sweep output (SWEEP OUT) which is synchronized with the square wave definition calibrating signal is obtained.

⑥ Adjust the sweep speed (TIME/DIV) of the unit so that the waveform on the CRT screen is suitable for adjusting the square wave.

⑦ Confirm that the square wave definition of the waveform on the CRT screen is as shown in (B) of Fig. 3-9. If it is like (A) or (C), adjust Y-COMP (RV 203,C203) on board A1 shown Fig. 3-10 so that the flattest characteristics are obtained.

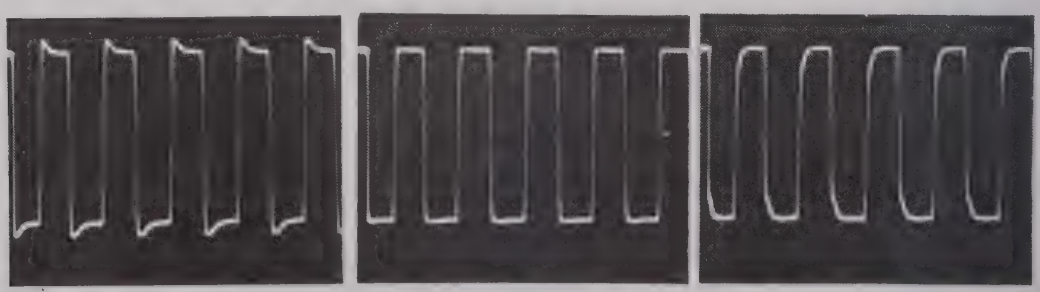


Fig. 3-9 *Adjusting square wave definition*

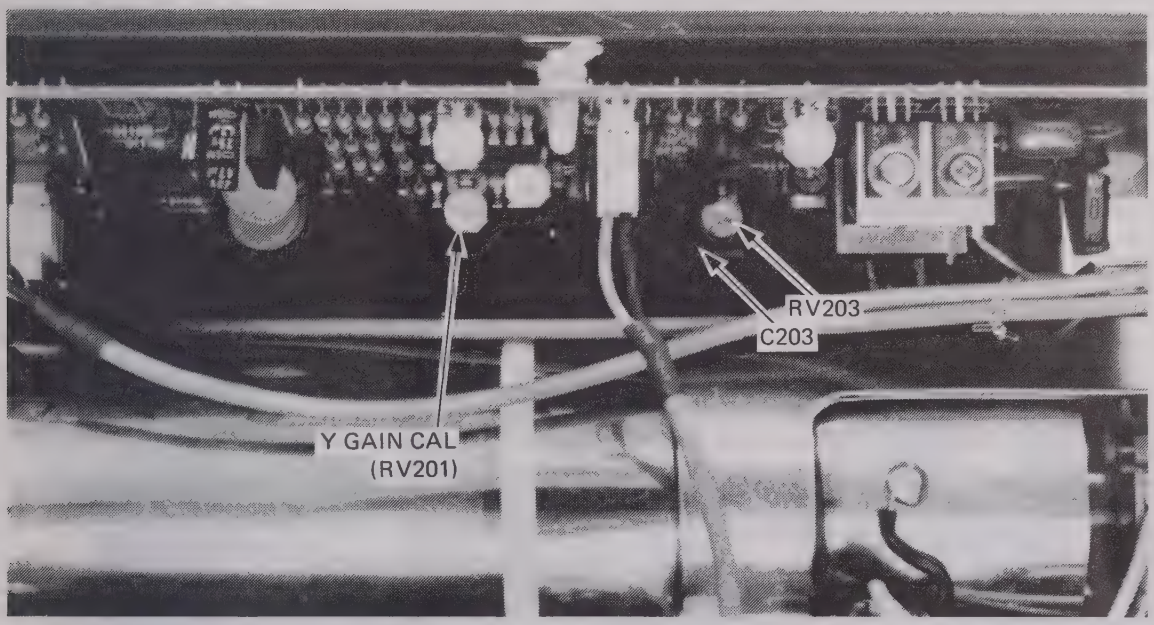


Fig. 3-10 *Adjustment position of Y-GAIN CAL (RV201) and Y-COMP (RV203, C203)*

7) Checking and adjusting Z axis amplifier

a) Checking and adjusting brightness

For this adjustment, the brightness should really be adjusted to a constant level using a raster scanner and an illuminometer. Because of problems inherent in the measuring equipment, however, a simplified checking method is described here.

① Perform initial setting of the unit in accordance with Table3-3.

② Connect the amplitude calibrating signal output of vertical axis calibrator set to 50 kHz, to the Y axis input terminal of the unit (can be either terminated or unterminated), and adjust the level of the signal output so that the amplitude on the CRT screen is approx. 8cm (8 DIV).

③ Obtain an oscilloscope provided with a sweep output (SWEEP OUT), and connect the sweep output of the oscilloscope to the X axis input terminal of this unit. (Set the oscilloscope to "free run".)

④ Adjust the sensitivity of the unit so that the length of the bright line on the X axis is 10cm (10 DIV).

⑤ Adjust the sweep time (TIME/DIV) of the oscilloscope so that a raster of 8× 10cm (8 × 10 DIV) is obtained.

⑥ Rotate the INTEN knob on the unit until a suitable brightness is obtained, and confirm that the phosphor of the screen is not burnt or deteriorated (confirm by varying the brightness). If the phosphor is significantly deteriorated or burnt, replace the CRT. (In this case, contact the customer.)

Caution

Do not leave the unit for a long period with a raster on the CRT. If it is necessary to leave the unit running, turn the INTEN knob fully left so that the bright line disappears.

⑦ If the phosphor is not burnt or burnt only to a very slight degree, it can be assumed that the unit has been used only for for a short period. In this case, turn the INTEN knob and check the brightness. (Confirm that there is adequate brightness to meet the customer's requirements. Note that the necessary brightness will vary depending on the ambient brightness.) If there is insufficient brightness, turn Z-GAIN CAL (RV301) on board A2 shown in Fig. 3-11 to the right to see whether or not it is set to maximum. (When the unit leaves the factory, this potentiometer is set to maximum.) If the potentiometer is not set to maximum, adjust it so that the necessary brightness required by the customer is obtained.)

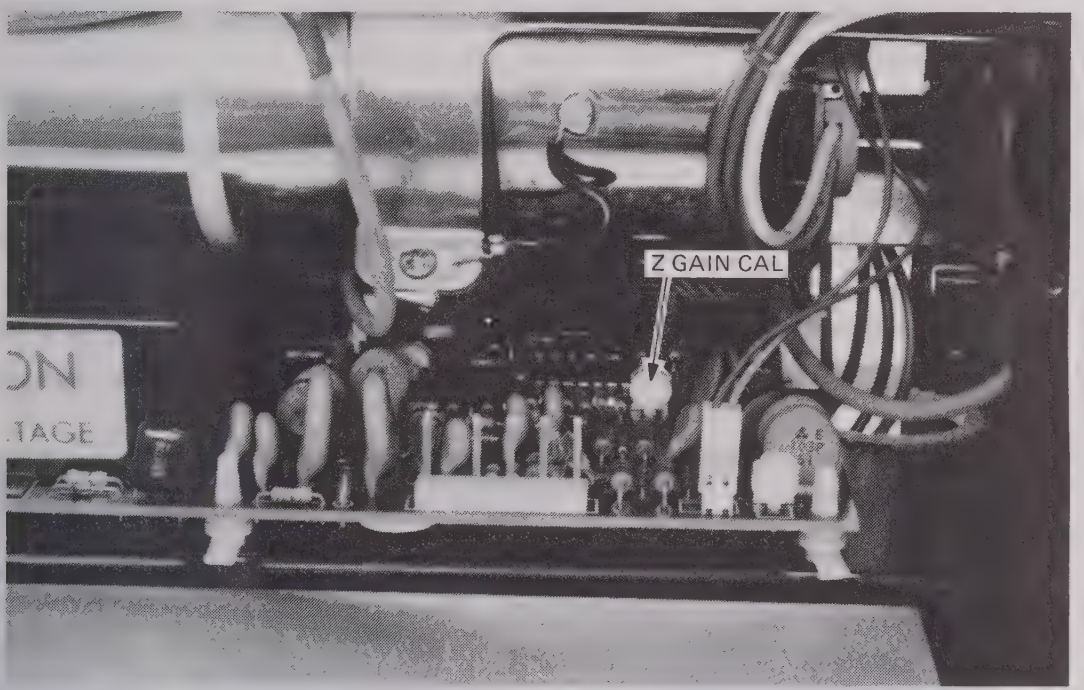


Fig. 3-11 *Adjustment position of Z-GAIN CAL (RV301)*

b) Checking and adjusting high speed response

① Perform initial setting of the unit in accordance with Table 3-3.

② Connect the square wave definition calibrating signal output from a vertical axis calibrator set to approx. 1 MHz, to the Z axis input terminal (terminated in 50 ohms). (Set the input amplitude to approx. 1V p-p, and the polarity so that the flat portion is somewhat bright.)

③ Obtain an oscilloscope provided with a sweep output (SWEEP OUT), and connect a trigger output which is synchronized with the square wave definition calibrating signal (or the branched output from the square wave definition calibrating signal) to the vertical axis input of the oscilloscope.

④ Input the sweep output (SWEEP OUT) of the oscilloscope to the X axis input terminal of this unit.

⑤ Adjust the trigger section of the oscilloscope so that a sweep output (SWEEP OUT)which is synchronized with the square wave definition calibrating signal is obtained.

⑥ Adjust the sweep speed of the oscilloscope (TIME/DIV) so that the bright line on the CRT screen becomes a readily visible dotted line.

⑦ Turn the INTEN knob to see whether or not there is any irregularity in the bright line. If there is irregularity, adjust Z-COMP (RV303,C303) on board A2 shown in Fig. 3-12.

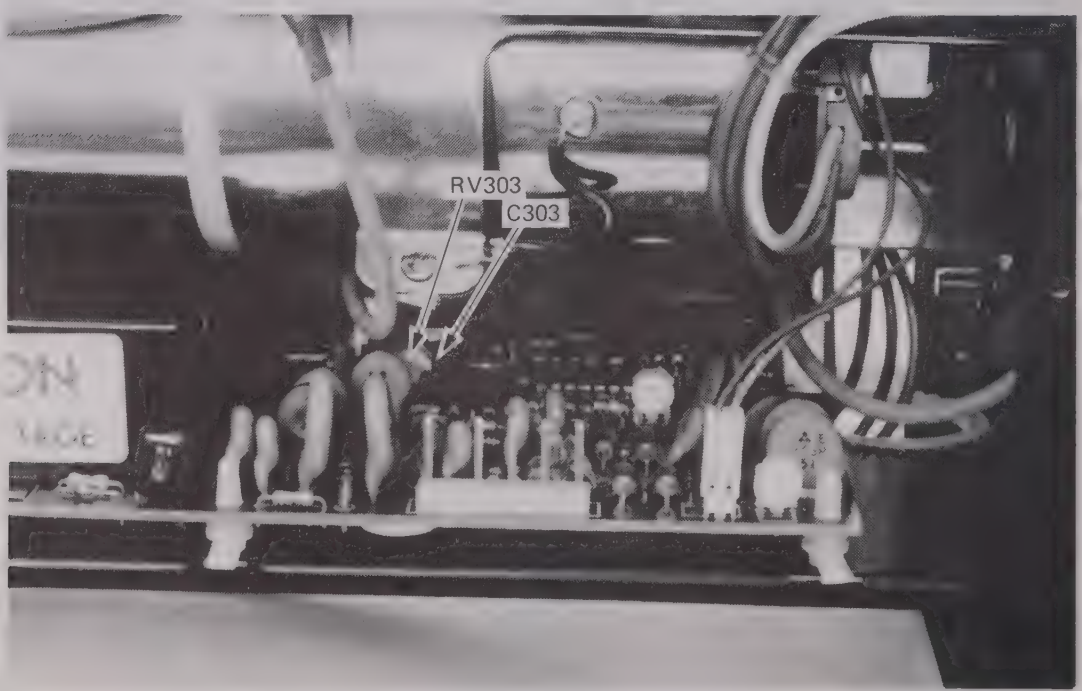


Fig.3-12 *Adjustment position of Z-COMP (RV303,C303)*

4. TROUBLESHOOTING

4-1 General

If the unit appears to be abnormal, first check its operation.

If a defect is found as a result of checking the operation of the unit, find out what section of the unit the trouble lies in (amplifier, CRT, or power supply section).

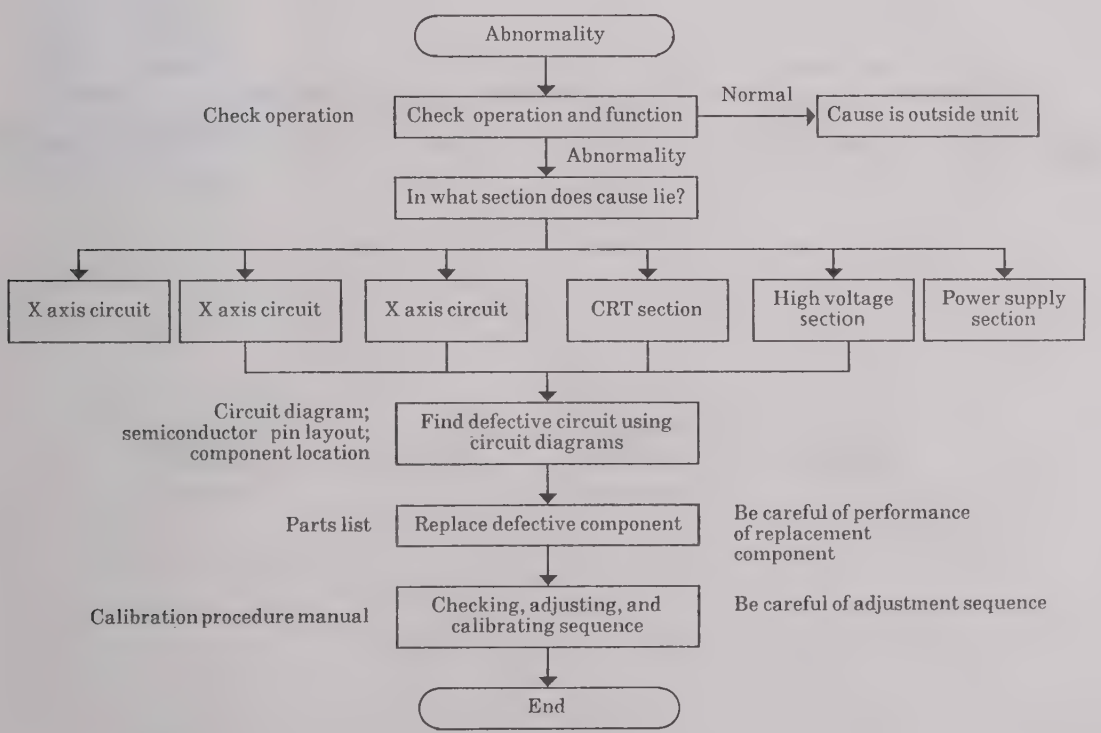
Next, based on the circuit diagrams and the voltages and waveforms shown on the circuit diagrams, locate the defective circuit. The component pin layout diagrams and the location of the components on the boards should be of assistance.

After finding the defective circuit then locating the defective component, check the performance of the component using the parts list (electronic components).

This unit uses special components in some circuits.

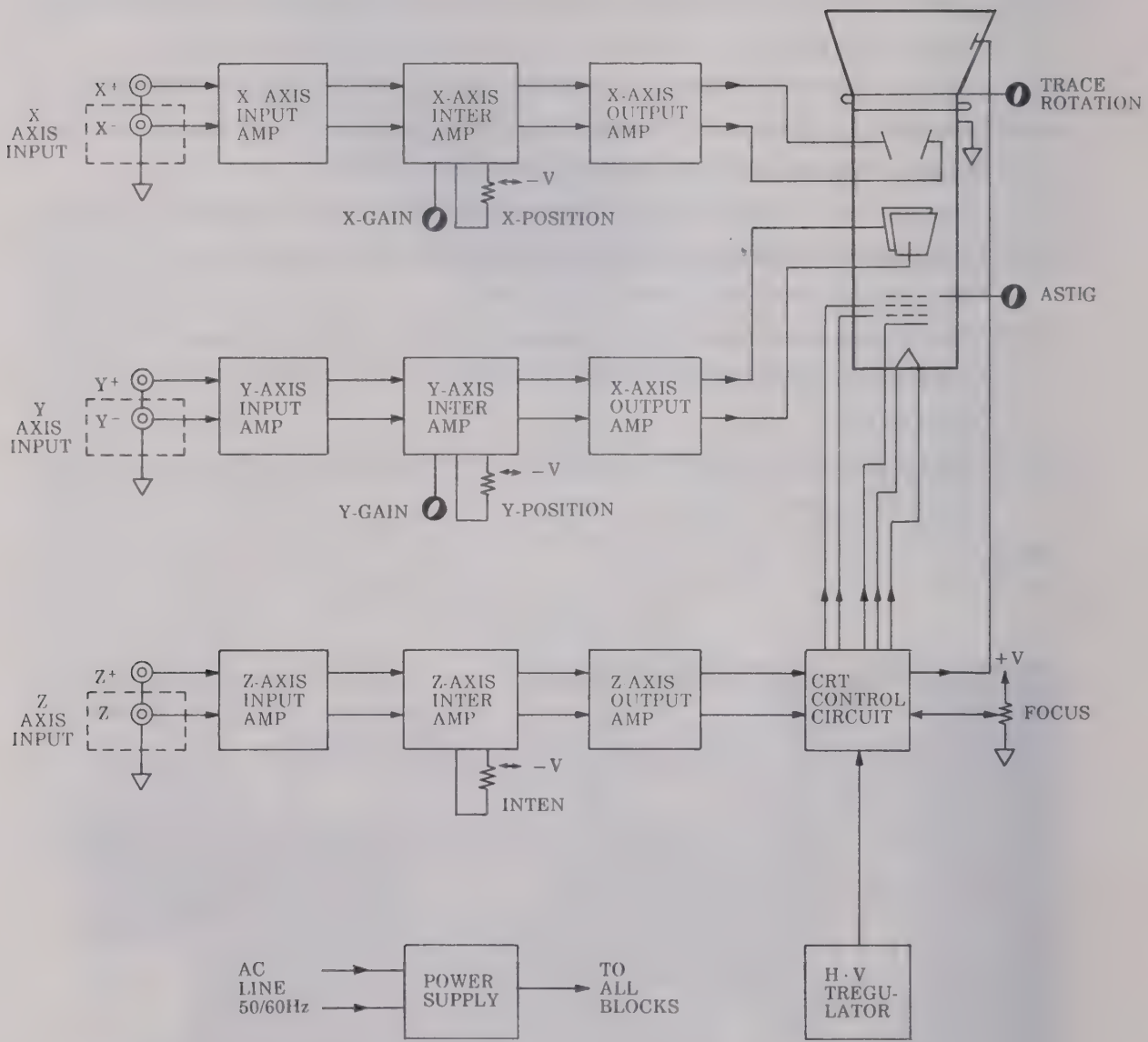
After becoming thoroughly familiar with the performance of the component, replace the defective component with Kikusui's designated component or one of equivalent performance.

After repairing a fault, be sure to adjust either the faulty section or the entire unit based on the calibration sub-section.



4-2 Block Diagram

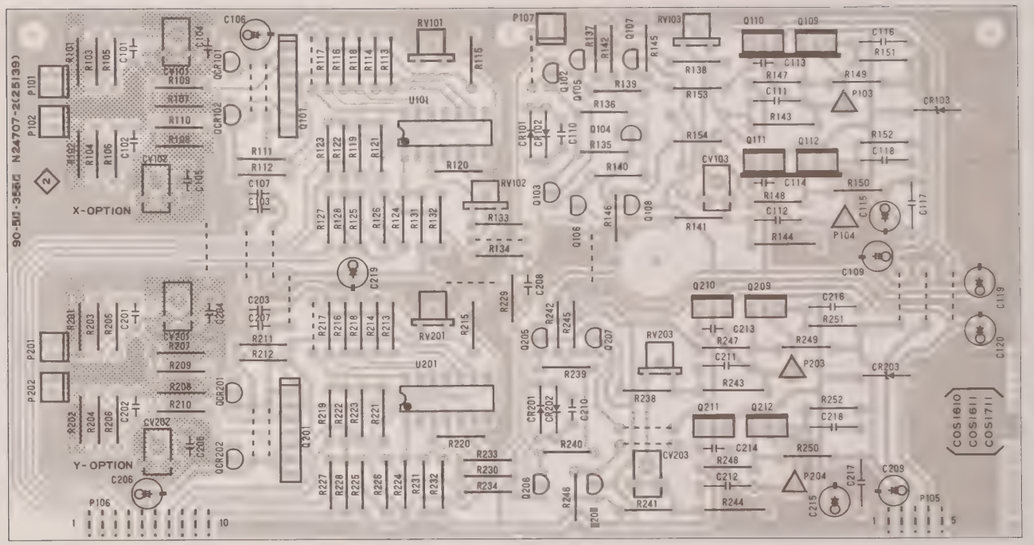
The following is the block diagram of this unit.



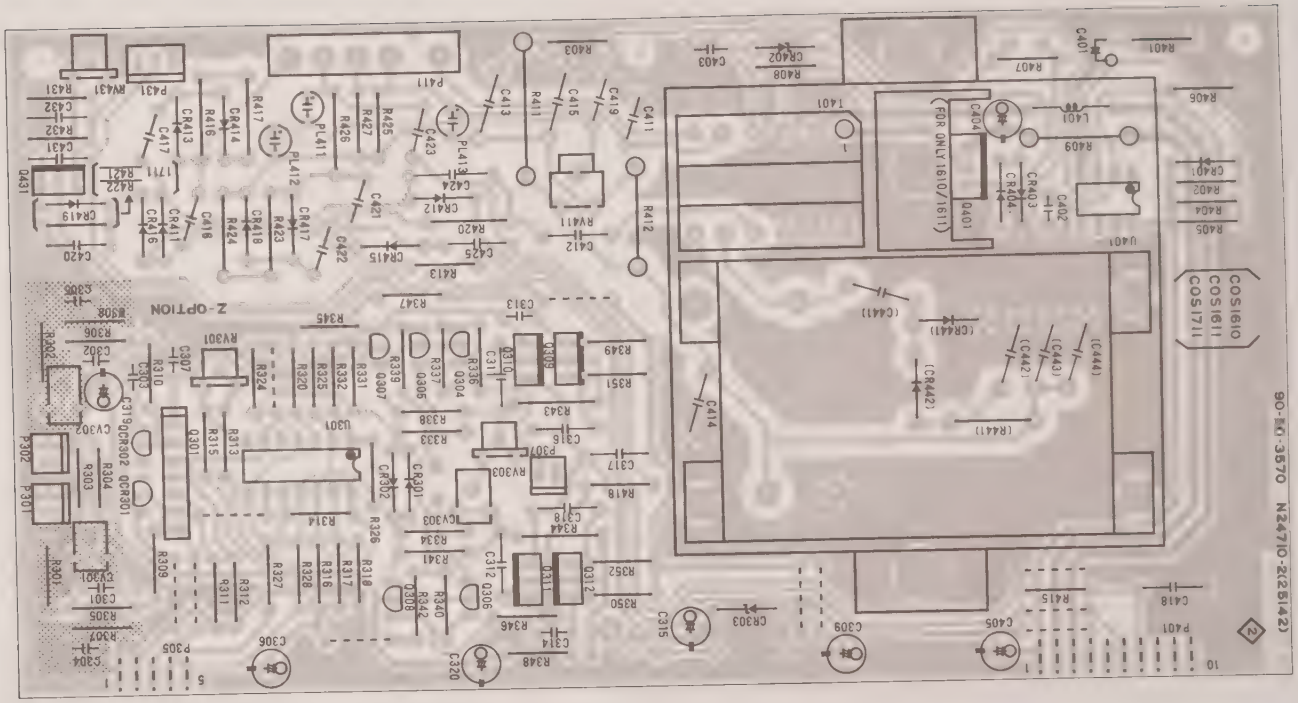
4-3 Parts Location

This section describes location of the parts on the boards used in the X-Y Display.

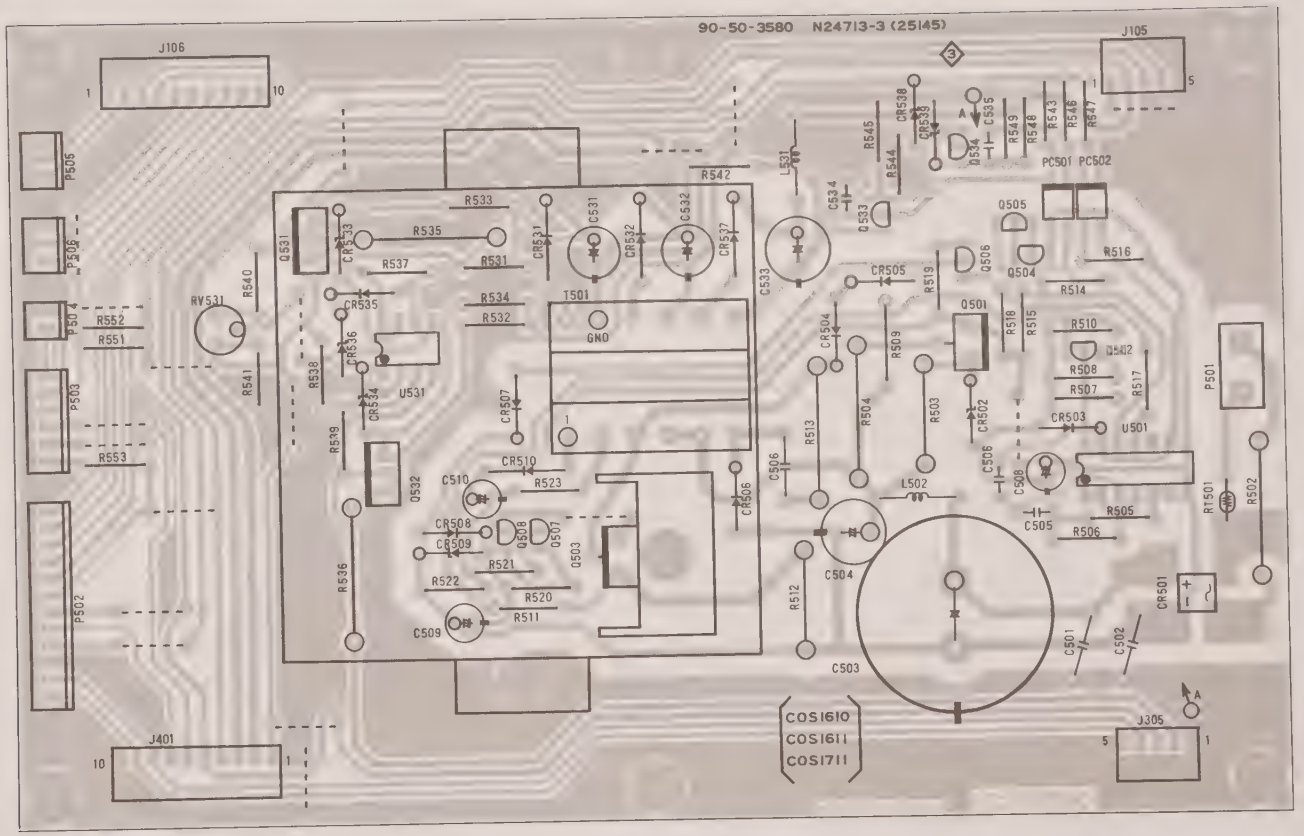
1) A1 X-Y AXIS AMP 23
2) A2 Z AMP & H.V 25
3) A3 POWER SUPPLY 27
4) A4 CRT CONTROL 27
5) A5 SUB CONTROL 27



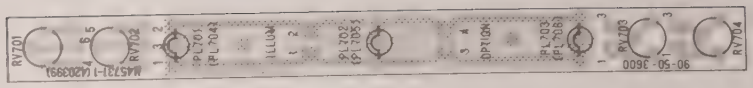
A1 X-Y AXIS AMP



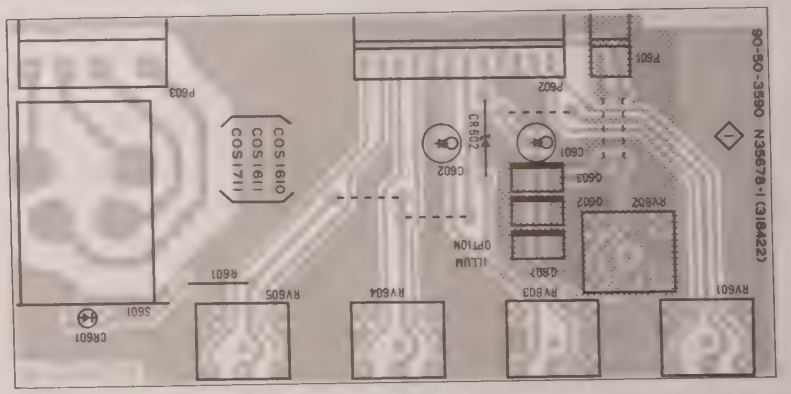
A2 Z AMP & H.V



A3 POWER SUPPLY



A5 SUB CONTROL



A4 CRT CONTROL

4-4 Circuit Diagram

COS1610/1611 X AXIS AMP & Y AXIS AMP ① 29

COS1610/1611 Z AXIS AMP & H.V ② 31

COS1610/1611 POWER SUPPLY ③ 33

COS1610/1611 CRT CONTROL & SUB CONTROL ④ 35

◎ *Comments*

Some of the units and functions of the parts shown in Table 4-1 have been omitted from the circuit diagrams.

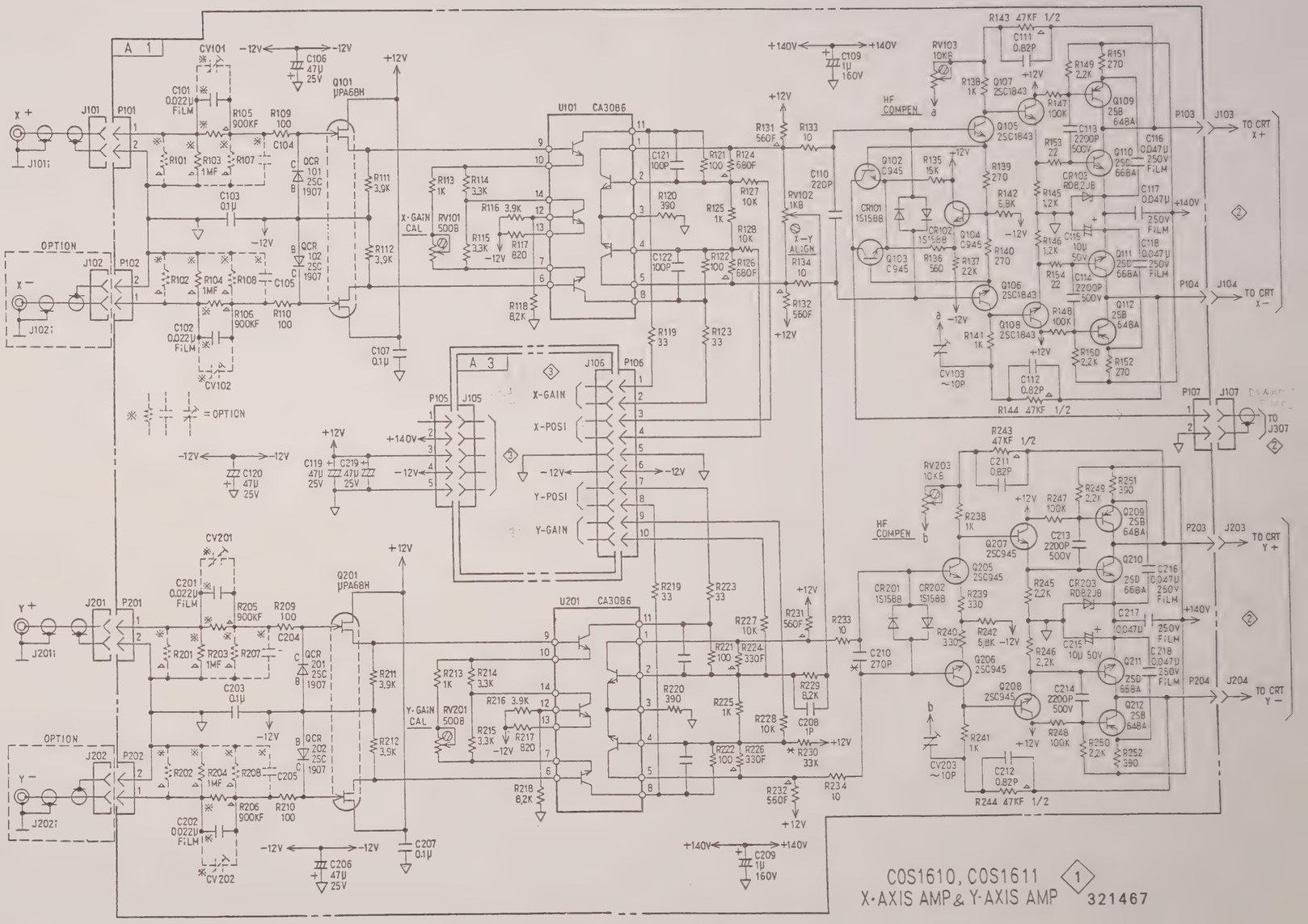
Part	Omitted unit	Omitted functions
Resistor	Ω (ohms)	Unless other noted, resistors are 1/4W carbon film type having an accuracy of ± 5%
Capacitor	F (Farads)	The type, accuracy, and rated voltage of capacitors are all different. For details, refer to the parts list.
Inductance	H (Henrys)	The type, accuracy, and allowable current of inductors are all different. For details, refer to the parts list.

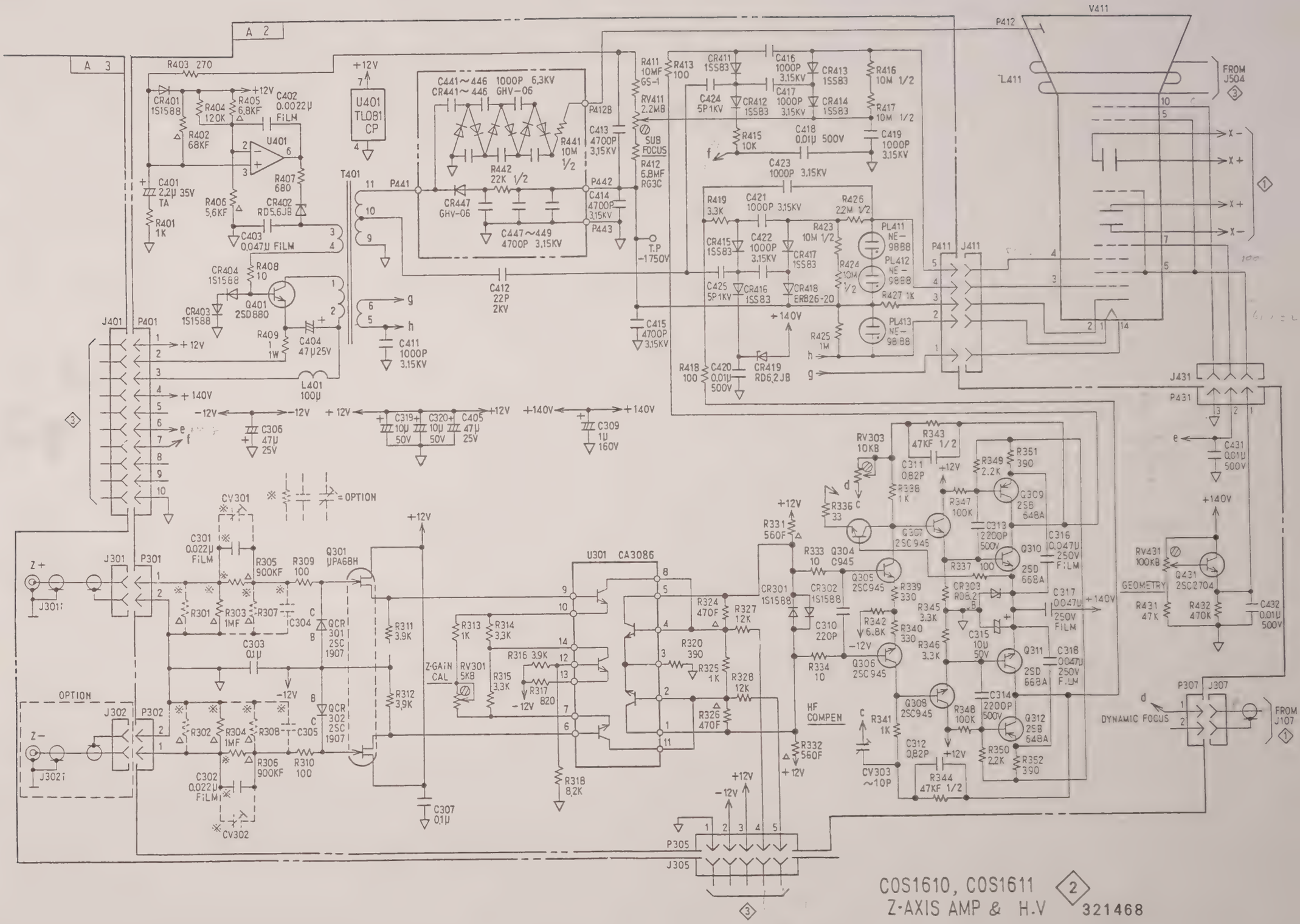
Table 4-1 *Omitted units and function*

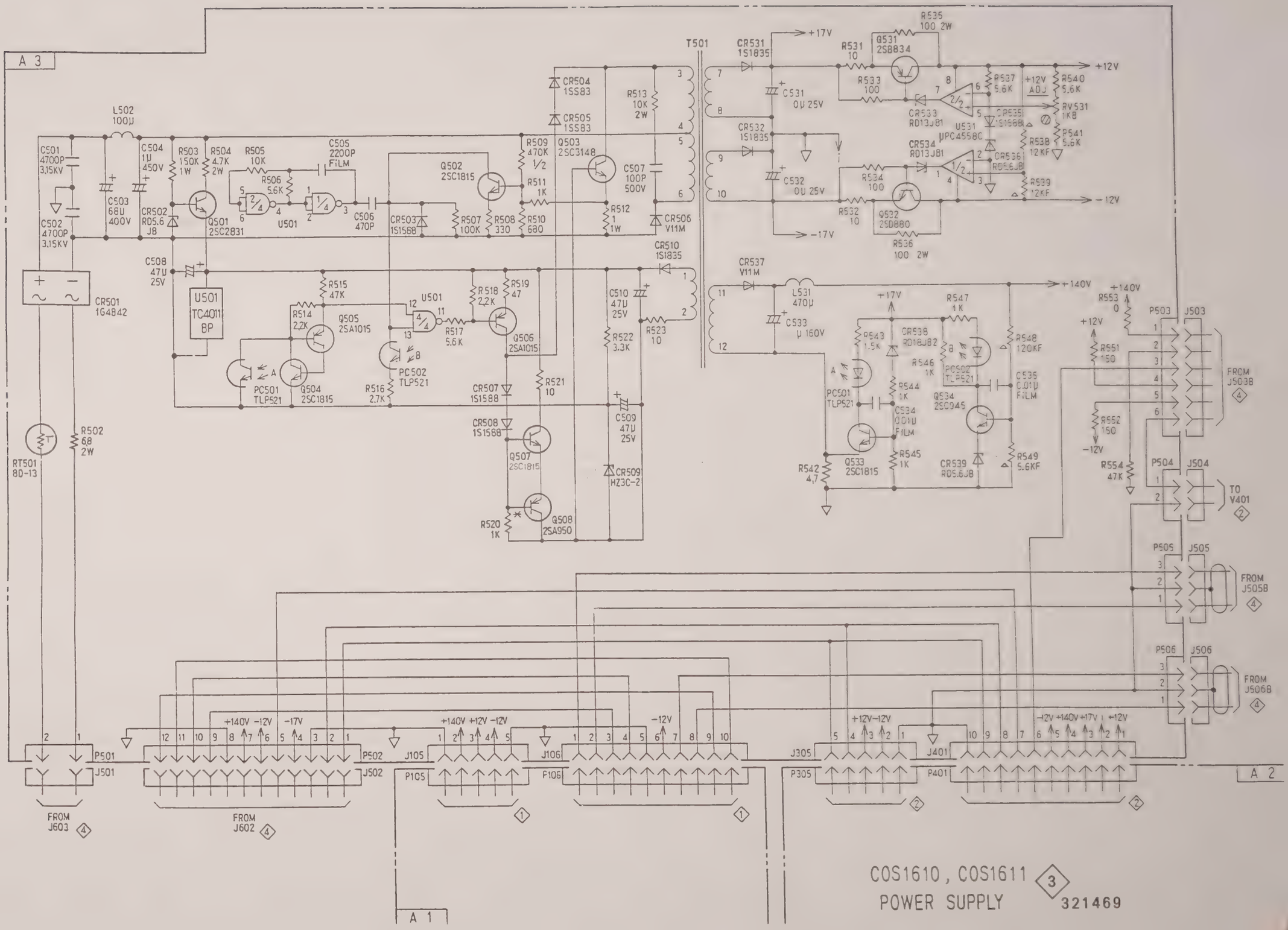
Table 4-2 Shows special symbols used in the circuit diagrams.

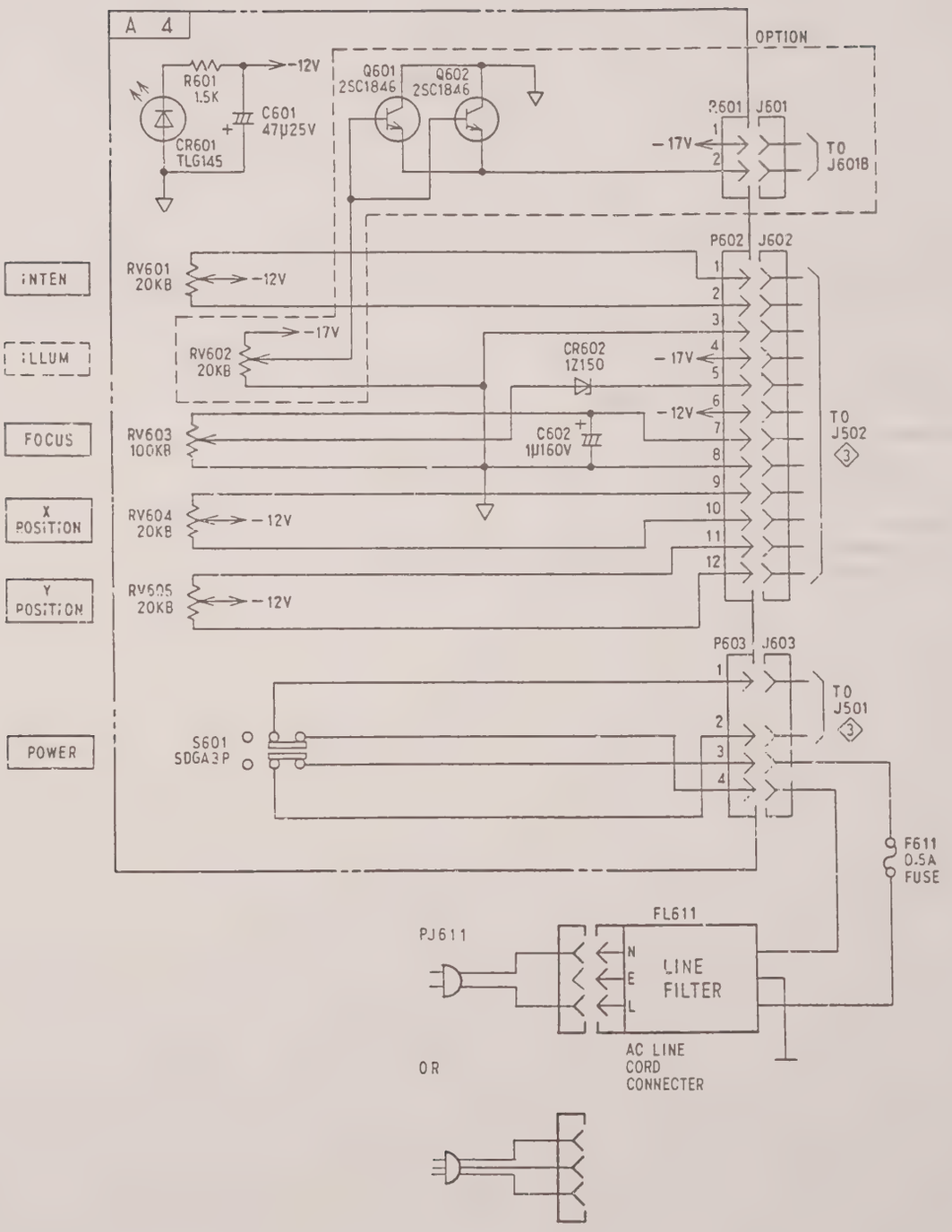
Symbols	Content
△	Indicates metal film resister
⊘	Indicates semi-fixed resistor, adjustable removing the case of unit.
◐	Indicates semi-fixed resistor, adjustable from the outside of unit.
※	Indicates parts which may be unavoidably changed for production reasons. Parts indicated are standard parts. Marked values are standard value.

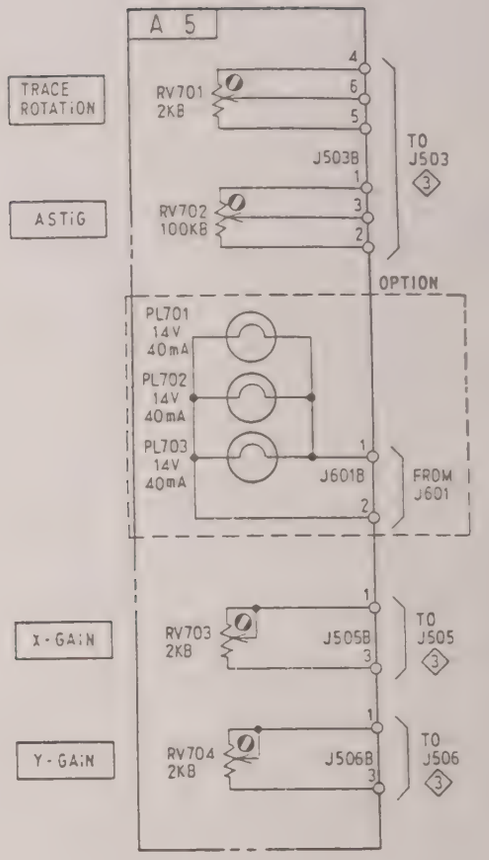
Table 4-2 *special symbols and their meanings*




A 2
A 3
V411
P412
L411
FROM J504
R403 270
+12V
U401 TL081 CP
CR401 1S1588
R404 120K
R405 6.8KF
C402 0.0022μ FILM
R402 68KF
U401
R407 680
C401 2.2μ 35V TA
R401 1K
R406 5.6KF
CR402 RD5.6JB
C403 0.047μ FILM
CR404 1S1588
R408 10
Q401 2SD880
CR403 1S1588
R409 1 1W
C404 47μ25V
L401 100μ
T401
C441~446 1000P 6.3KV
CR441~446 GHV-06
R441 10M 1/2
R442 22K 1/2
CR447 GHV-06
C447~449 4700P 3.15KV
P412B
P441
P442
P443
C413 4700P 3.15KV
C414 4700P 3.15KV
C412 22P 2KV
C411 1000P 3.15KV
C415 4700P 3.15KV
T.P -1750V
R411 10MF GS-1
R413 100
RV411 2.2MB
SUB FOCUS
R412 6.8MF RG3C
CR411 1SS83
C416 1000P 3.15KV
CR413 1SS83
R416 10M 1/2
C424 5P1KV
CR412 1SS83
C417 1000P 3.15KV
CR414 1SS83
R417 10M 1/2
R415 10K
C418 0.01μ 500V
C419 1000P 3.15KV
C423 1000P 3.15KV
R419 3.3K
C421 1000P 3.15KV
R426 22M 1/2
CR415 1SS83
C422 1000P 3.15KV
CR417 1SS83
R423 10M 1/2
PL411 NE-9888
PL412 NE-9888
C425 5P1KV
CR416 1SS83
CR418 ERB26-20
R424 10M 1/2
R427 1K
+140V
PL413 NE-9888
R425 1M
R418 100
C420 0.01μ 500V
CR419 RD6.2JB
P411
J411
J431
P431
J401
P401
L411
-12V
C306 47μ 25V
C319 10μ 50V
C320 10μ 50V
C405 47μ 25V
C309 1μ 160V
C431 0.01μ 500V
RV303 10KB
R343 47KF 1/2
C311 0.82P
R338 1K
R336 33
R349 2.2K
R351 390
R347 100K
Q309 2SB 648A
Q307 2SC945
C313 2200P 500V
C316 0.047μ 250V FILM
R337 100
Q310 2SD 668A
R331 560F
R333 10
Q304 C945
Q305 2SC945
CR301 1S1588
CR302 1S1588
R339 330
CR303 RD6.2B
C317 0047μ 250V FILM
+140V
C310 220P
R342 6.8K
R340 330
R345 3.3K
C315 10μ 50V
Q311 2SD 668A
C318 0047μ 250V FILM
R334 10
Q306 2SC945
R346 3.3K
C314 2200P 500V
Q308 2SC945
R348 100K
Q312 2SB 648A
R341 1K
C312 0.82P
R350 2.2K
R352 390
CV303 ~10P
R344 47KF 1/2
RV431 100KB
Q431 2SC2704
GEOMETRY
R431 47K
R432 470K
C432 0.01μ 500V
P307
J307
DYNAMIC FOCUS
FROM J107
CV301
= OPTION
C301 0.022μ FILM
Z+
J301
P301
R305 900KF
R309 100
Q301 μPA68H
R301
R303 1MF
R307
C304
C303 0.1μ
QCR 301 2SC 1907
R311 3.9K
R312 3.9K
OPTION
J302
P302
Z-
J302
R302
R304 1MF
R308
C305
R306 900KF
R310 100
C302 0.022μ FILM
CV302
U301 CA3086
R313 1K
R314 3.3K
R316 3.9K
R317 820
R315 3.3K
Z-GAIN CAL
RV301 5KB
R324 470F
R327 12K
R320 390
R325 1K
R328 12K
R326 470F
HF COMPEN
R332 560F
R318 8.2K
C307 0.1μ
P305
J305
COS1610, COS1611
Z-AXIS AMP & H.V
321468


A 3
T501
L502 100µ
C501 4700P 3.15KV
C502 4700P 3.15KV
C503 68µ 400V
C504 1µ 450V
R503 150K 1W
R504 4.7K 2W
R505 10K
R506 5.6K
C505 2200P FILM
C506 470P
CR501 1G4B42
RT501 8D-13
R502 68 2W
CR502 RD5.6 JB
Q501 2SC2831
U501 TC4011 BP
CR503 1S1588
R507 100K
R508 330
R509 470K 1/2
R510 680
Q502 2SC1815
Q503 2SC3148
R511 1K
R512 1 1W
R513 10K 2W
C507 100P 500V
CR504 1SS83
CR505 1SS83
CR506 V11M
CR510 1S1835
C508 47µ 25V
R515 47K
R514 2.2K
Q505 2SA1015
PC501 TLP521
Q504 2SC1815
R516 2.7K
PC502 TLP521
R517 5.6K
R518 2.2K
R519 47
Q506 2SA1015
C510 47µ 25V
R522 3.3K
R523 10
CR507 1S1588
R521 10
CR508 1S1588
Q507 2SC1815
R520 1K
Q508 2SA950
C509 47µ 25V
CR509 HZ3C-2
CR531 1S1835
+17V
R531 10
Q531 2SB834
R535 100 2W
R533 100
C531 0µ 25V
CR532 1S1835
C532 0µ 25V
R534 100
R532 10
Q532 2SD880
R536 100 2W
-17V
-12V
+12V
R537 5.6K
+12V ADJ
R540 5.6K
RV531 1KB
R541 5.6K
CR533 RD13JB1
U531 µPC4558C
CR534 RD13JB1
CR535 1S1588
CR536 RD5.6JB
R538 12KF
R539 12KF
CR537 V11M
L531 470µ
C533 µ 160V
+140V
R547 1K
R548 120KF
R543 1.5K
CR538 RD18JB2
R546 1K
PC501 TLP521
PC502 TLP521
R544 1K
C534 0.01µ FILM
C535 0.01µ FILM
Q534 2SC945
Q533 2SC1815
R545 1K
R542 4.7
CR539 RD5.6JB
R549 5.6KF
R553 0
R551 150
R552 150
R554 47K
P503 J503
FROM J503B
P504 J504
TO V401
P505 J505
FROM J505B
P506 J506
FROM J506B
P501 J501
P502 J502
P105 J105
P106 J106
P305 J305
P401 J401
FROM J603
FROM J602
A 1
A 2
COS1610, COS1611
POWER SUPPLY
321469



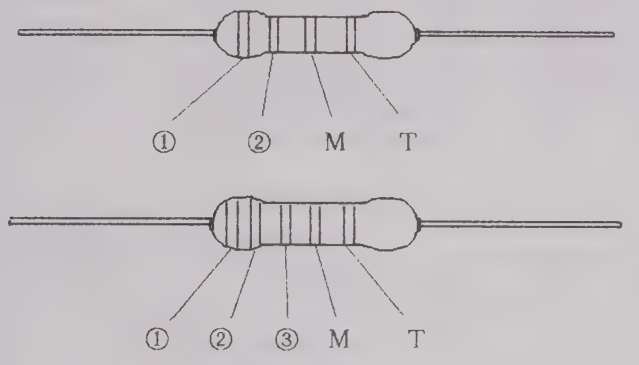


COS1610, COS1611
CRT CONTROL & SUB CONTROL
4
321470

4-5 Exterior of Comporments

The exterior of electronic comporments used in this unit, including indications on them, and pin arrangement, is shown below.

4-5-1 Indication of resistance value and resistance accurary.



① ② and ③ – 1st, and 2nd, and 3rd sigunificant figures

M – multiplier

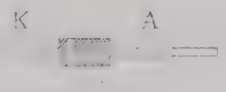
T – tolerance

Table 4-3 shows resistance value indication system

COLOR	SIGNIFICANT FIGURES	MULTIPLIER	TOLERANCE
BLACK	0	1	———
BROWN	1	10	±1%
RED	2	10^2 or 100	±2%
ORANGE	3	10^3 or 1K	±3%
YELLOW	4	10^4 or 10K	±4%
GREEN	5	10^5 or 100K	±0.5%
BLUE	6	106 or 1M	±0.25%
VIOLET	7	———	±0.1%
GRAY	8	———	———
WHITE	9	———	———
GOLD	———	10^{-1} or 0.1	±5%
SILVER	———	10^{-2} or 0.01	±10%
NONE	———	———	±20%

Table 4-3 *Resistance value indecation system color cords.*

4-5-2 Exterior of semiconductors and pin arrangement



1S1835

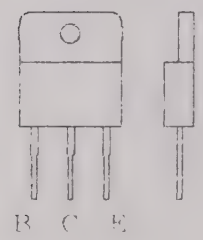
GHV-06

1S1588
1SS83

IG4B42

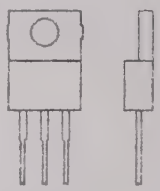
HZ3C-2
RD5.6JB～RD18JB

V11M
ERB26-20

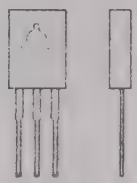


2SC1846

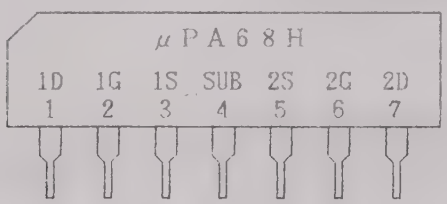
2SA950
2SA1015
2SC945
2SC1815
2SC1843
2SC1907

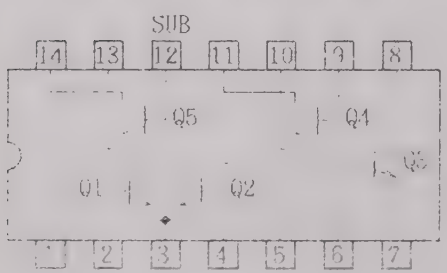


2SB834
2SC2831
2SC3148
2SD880

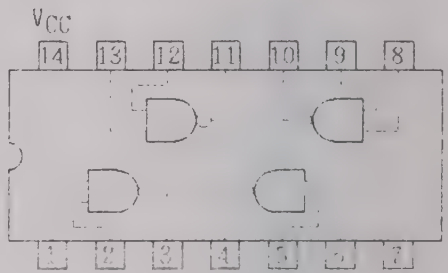


2SC648A
2SC2704
2SD668A

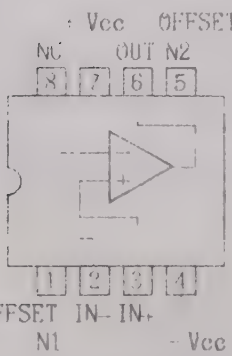




CA3086

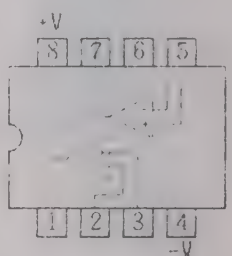


TC4011BP



TL081CP

TLP521-1



μPC4558C

4-6 Electrical Parts List

The parts used in this Instrument are listed in units of assemblies.

Table 4-4 lists the assemblies and their contents.

Assembly Name	Contents
B ASSEMBLY	Parts not mounted on PC board.
A1 ASSEMBLY	Parts mounted on A1 board. (X-Y AXIS AMPLIFIER)
A2 ASSEMBLY	Parts mounted on A2 board. (Z AMP & H.V)
A3 ASSEMBLY	Parts mounted on A3 board. (POWER SUPPLY)
A4 ASSEMBLY	Parts mounted on A4 board. (CRT CONTROL)
A5 ASSEMBLY	Parts mounted on A5 board. (SUB CONTROL)

Table 4-4 *Assemblies*

Mnemonic symbols are used for the explanation of parts.

Table 4-5 lists the Mnemonic symbols

Mnemonic symbol	Meaning
CER	CERAMIC
C FILM	CARBON FILM
C COMP	CARBON COMPOSITION
CRT	CATHODE RAY TUBE
ELECT	ELECTROLYTIC
FET	FIELD EFFECT TRANSISTOR
FXD	FIXED
LED	LIGHT EMITTING DIODE
M FILM	METAL FILM
M GLAZE	METAL GLAZE
M OX	METAL OXIDE
M PLSTC FILM	METALLIZED PLASTIC FILM
SI	SILICON
TANT ELECT	TANTALUM ELECTROLYTIC
VAR	VARIABLE
WW	WIRE WOUND
*	OPTIMUM VALUE SELECTED AT FACTRY AVERAGE VALUE SHOWN. (PART MAY BE OMITTED)

Table 4-5 *Mnemonic symbols*

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION	COS1610	
B ASSEMBLY					
F611		99-02-0001	FUSE 0.5A-250V S.B 5.2 X20		SD6
L411		66-21-0090	ROTATION COIL	S8401241	
V411		21-45-0600	CATHODE RAY TUBE	TOSHIBA	E8305B31
A1 ASSEMBLY					
C101		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C102		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C103		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C106		54-00-0114	FXD ELECT 47MF 25WV		
C107		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C109		54-60-1550	FXD ELECT 1MF 160WV		
C110		52-06-2265	FXD CER 220PF 10% 50V TYPE1		
C111		52-96-1120	CGM A 082 K G CON		
C112		52-96-1120	CGM A 082 K G CON		
C113		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C114		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C115		54-00-0311	FXD ELECT 10MF 50WV		
C116		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C117		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C118		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C119		54-00-0114	FXD ELECT 47MF 25WV		
C120		54-00-0114	FXD ELECT 47MF 25WV		
C121		52-06-2225	FXD CER 100PF 10% 50V TYPE1		
C122		52-06-2225	FXD CER 100PF 10% 50V TYPE1		
C201		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C202		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C203		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C206		54-00-0114	FXD ELECT 47MF 25WV		
C207		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C208		52-06-2010	FXD CER 1PF 10% 50V TYPE1		
C209		54-60-1550	FXD ELECT 1MF 160WV		
C210	*	52-06-2274	FXD CER 270P 10% 50V TYPE1		
C211		52-96-1120	CGM A 082 K G CON		
C212		52-96-1120	CGM A 082 K G CON		
C213		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C214		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C215		54-00-0311	FXD ELECT 10MF 50WV		
C216		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C217		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C218		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C219		54-00-0114	FXD ELECT 47MF 25WV		
CR101		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR102		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR103		32-92-0082	ZENER VZ=7.7 -8.7 V P=0.4W	NEC	RD8.2JB

REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION COS1610		
CR201	32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR202	32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR203	32-92-0082	ZENER VZ=7.7 -8.7 V P=0.4W	NEC	RD8.2JB
CV103	57-10-1270	CER TRIM CTZ53C 3-10PF		
CV203	57-10-1270	CER TRIM CTZ53C 3-10PF		
Q101	31-90-0080	FET DUAL	NEC	UPA68H-M
Q102	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q103	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q104	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q105	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q106	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q107	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q108	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q109	30-20-6481	TR SI PNP	HITACHI	2SB648A
Q110	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q111	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q112	30-20-6481	TR SI PNP	HITACHI	2SB648A
Q201	31-90-0080	FET DUAL	NEC	UPA68H-M
Q205	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q206	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q207	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q208	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q209	30-20-6481	TR SI PNP	HITACHI	2SB648A
Q210	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q211	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q212	30-20-6481	TR SI PNP	HITACHI	2SB648A
QCR101	30-31-9071	TR SI NPN	HITACHI	2SC1907
QCR102	30-31-9071	TR SI NPN	HITACHI	2SC1907
QCR201	30-31-9071	TR SI NPN	HITACHI	2SC1907
QCR202	30-31-9071	TR SI NPN	HITACHI	2SC1907
R103	42-83-5100	FXD M FILM 1M OHM 1% 1/4W		
R104	42-83-5100	FXD M FILM 1M OHM 1% 1/4W		
R105	42-83-4900	FXD M FILM 900K OHM 1% 1/4W		
R106	42-83-4900	FXD M FILM 900K OHM 1% 1/4W		
R109	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R110	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R111	40-27-2392	FXD C FILM 3.9K OHM 5% 1/4W		
R112	40-27-2392	FXD C FILM 3.9K OHM 5% 1/4W		
R113	40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R114	40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W		
R115	40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W		
R116	40-27-2392	FXD C FILM 3.9K OHM 5% 1/4W		
R117	40-27-1822	FXD C FILM 820 OHM 5% 1/4W		
R118	40-27-2822	FXD C FILM 8.2K OHM 5% 1/4W		
R119	40-27-0332	FXD C FILM 33 OHM 5% 1/4W		NAS1/4S
R120	40-27-1392	FXD C FILM 390 OHM 5% 1/4W		
R121	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R122	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R123	40-27-0332	FXD C FILM 33 OHM 5% 1/4W		NAS1/4S
R124	42-83-1680	FXD M FILM 680 OHM 1% 1/4W		

REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1610	
R125	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S,
R126	42-83-1680	FXD M FILM 680	OHM 1% 1/4W	
R127	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R128	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R131	42-83-1560	FXD M FILM 560	OHM 1% 1/4W	
R132	42-83-1560	FXD M FILM 560	OHM 1% 1/4W	
R133	40-27-0102	FXD C FILM 10	OHM 5% 1/4W	NAS1/4S
R134	40-27-0102	FXD C FILM 10	OHM 5% 1/4W	NAS1/4S
R135	40-27-3152	FXD C FILM 15K	OHM 5% 1/4W	
R136	40-27-1562	FXD C FILM 560	OHM 5% 1/4W	
R137	40-27-3222	FXD C FILM 22K	OHM 5% 1/4W	
R138	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R139	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R140	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R141	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R142	40-27-2682	FXD C FILM 6.8K	OHM 5% 1/4W	
R143	42-34-2220	FXD M FILM 47	OHM 1% 1/2W	
R144	42-34-2220	FXD M FILM 47	OHM 1% 1/2W	
R145	40-27-2122	FXD C FILM 1.2K	OHM 5% 1/4W	
R146	40-27-2122	FXD C FILM 1.2K	OHM 5% 1/4W	
R147	40-27-4102	FXD C FILM 100K	OHM 5% 1/4W	
R148	40-27-4102	FXD C FILM 100K	OHM 5% 1/4W	
R149	40-27-2222	FXD C FILM 2.2K	OHM 5% 1/4W	
R150	40-27-2222	FXD C FILM 2.2K	OHM 5% 1/4W	
R151	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R152	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R153	40-27-0222	FXD C FILM 22	OHM 5% 1/4W	NAS1/4S
R154	40-27-0222	FXD C FILM 22	OHM 5% 1/4W	NAS1/4S
R203	42-83-5100	FXD M FILM 1M	OHM 1% 1/4W	
R204	42-83-5100	FXD M FILM 1M	OHM 1% 1/4W	
R205	42-83-4900	FXD M FILM 900K	OHM 1% 1/4W	
R206	42-83-4900	FXD M FILM 900K	OHM 1% 1/4W	
R209	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R210	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R211	40-27-2392	FXD C FILM 3.9K	OHM 5% 1/4W	
R212	40-27-2392	FXD C FILM 3.9K	OHM 5% 1/4W	
R213	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R214	40-27-2332	FXD C FILM 3.3K	OHM 5% 1/4W	
R215	40-27-2332	FXD C FILM 3.3K	OHM 5% 1/4W	
R216	40-27-2392	FXD C FILM 3.9K	OHM 5% 1/4W	
R217	40-27-1822	FXD C FILM 820	OHM 5% 1/4W	
R218	40-27-2822	FXD C FILM 8.2K	OHM 5% 1/4W	
R219	40-27-0332	FXD C FILM 33	OHM 5% 1/4W	NAS1/4S
R220	40-27-1392	FXD C FILM 390	OHM 5% 1/4W	
R221	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R222	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R223	40-27-0332	FXD C FILM 33	OHM 5% 1/4W	NAS1/4S
R224	42-83-1330	FXD M FILM 330	OHM 1% 1/4W	
R225	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R226	42-83-1330	FXD M FILM 330	OHM 1% 1/4W	
R227	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R228	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R229	40-27-2822	FXD C FILM 8.2K	OHM 5% 1/4W	
R230	40-27-3332	FXD C FILM 33K	OHM 5% 1/4W	

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION	COS1610
R231		42-83-1560	FXD M FILM 560 OHM 1% 1/4W	
R232		42-83-1560	FXD M FILM 560 OHM 1% 1/4W	
R233		40-27-0102	FXD C FILM 10 OHM 5% 1/4W	NAS1/4S
R234		40-27-0102	FXD C FILM 10 OHM 5% 1/4W	NAS1/4S
R238		40-27-2102	FXD C FILM 1K OHM 5% 1/4W	NAS1/4S
R239		40-27-1332	FXD C FILM 330 OHM 5% 1/4W	
R240		40-27-1332	FXD C FILM 330 OHM 5% 1/4W	
R241		40-27-2102	FXD C FILM 1K OHM 5% 1/4W	NAS1/4S
R242		40-27-2682	FXD C FILM 6.8K OHM 5% 1/4W	
R243		42-34-2220	FXD M FILM 47 OHM 1% 1/2W	
R244		42-34-2220	FXD M FILM 47 OHM 1% 1/2W	
R245		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W	
R246		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W	
R247		40-27-4102	FXD C FILM 100K OHM 5% 1/4W	
R248		40-27-4102	FXD C FILM 100K OHM 5% 1/4W	
R249		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W	
R250		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W	
R251		40-27-1392	FXD C FILM 390 OHM 5% 1/4W	
R252		40-27-1392	FXD C FILM 390 OHM 5% 1/4W	
RV101		48-31-1500	VAR M GLAZE 500 OHM B PH	
RV102		48-31-2100	VAR M GLAZE 1K OHM B PH	
RV103		48-31-3100	FXD M GLAZE 10K OHM B PH	
RV201		48-31-1500	VAR M GLAZE 500 OHM B PH	
RV203		48-31-3100	FXD M GLAZE 10K OHM B PH	
U101		30-90-0141	TRANSISTOR ARRAYS 5 NPN RCA	CA3086
U201		30-90-0141	TRANSISTOR ARRAYS 5 NPN RCA	CA3086
A2 ASSEMBLY				
C301		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV	
C302		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV	
C303		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2	
C306		54-00-0114	FXD ELECT 47MF 25WV	
C307		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2	
C309		54-60-1550	FXD ELECT 1MF 160WV	
C311		52-96-1120	CGM A 082 K G CON	
C312		52-96-1120	CGM A 082 K G CON	
C313		52-01-3385	FXD CER 2220PF 10% 500V TYPE2	
C314		52-01-3385	FXD CER 2220PF 10% 500V TYPE2	
C315		54-00-0311	FXD ELECT 10MF 50WV	
C316		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV	
C317		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV	
C318		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV	
C319		54-00-0311	FXD ELECT 10MF 50WV	
C320		54-00-0311	FXD ELECT 10MF 50WV	
C401		55-37-2050	FXD TANT ELECT 1UF 35V	
C402		50-67-0020	FXD PLSTC FILM 0.0047MF 10% 100WV	
C403		50-67-0050	FXD PLSTC FILM 0.047MF 10% 100WV	
C404	*	54-00-0114	FXD ELECT 47MF 25WV	
C405		54-00-0114	FXD ELECT 47MF 25WV	

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION			COS1610
C411		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C412		52-08-5145	FXD CER	22PF	10% 2KV TYPE1	
C413		52-98-1000	FXD CER	4700PF	+80-20% 3.15KV TYPE1	
C414		52-98-1000	FXD CER	4700PF	+80-20% 3.15KV TYPE1	
C415		52-98-1000	FXD CER	4700PF	+80-20% 3.15KV TYPE1	
C416		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C417		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C418		52-03-3469	FXD CER	0.01UF	+100-0% 500V TYPE2	
C419		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C420		52-03-3469	FXD CER	0.01UF	+100-0% 500V TYPE2	
C421		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C422		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C423		52-98-1020	FXD CER	1000PF	+80 - -20% 3.15KV	
C424		52-96-1170	FXD CER	5PF	1KV	
C425		52-96-1170	FXD CER	5PF	1KV	
C431		52-03-3469	FXD CER	0.01UF	+100-0% 500V TYPE2	
C432		52-03-3469	FXD CER	0.01UF	+100-0% 500V TYPE2	
CR301		32-11-5880	DIODE VR=30V IO=120MA			TOSHIBA 1S1588
CR302		32-11-5880	DIODE VR=30V IO=120MA			TOSHIBA 1S1588
CR303		32-92-0082	ZENER VZ=7.7 -8.7 V P=0.4W			NEC RD8.2JB
CR401		32-11-5880	DIODE VR=30V IO=120MA			TOSHIBA 1S1588
CR402		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W			NEC RD5.6JB2
CR403		32-11-5880	DIODE VR=30V IO=120MA			TOSHIBA 1S1588
CR404		32-11-5880	DIODE VR=30V IO=120MA			TOSHIBA 1S1588
CR411		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR412		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR413		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR414		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR415		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR416		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR417		32-30-0830	DIODE VR=250V IO=200MA			HITACHI 1SS83
CR418		32-90-1820	DIODE VR=2KV FAST RECOVERY			HITACHI ERB26-20
CR419	*	32-92-0062	ZENER VZ=5.8 - 6.6V P=0.4W			NEC RD6.2JB
CV303		57-10-1270	CER TRIM CTZ53C 3-10PF			
L401		67-10-0890	INDUCTOR 100MH 10%			
PL411		23-70-0100	LAMP NEON			
PL412		23-70-0100	LAMP NEON			
PL413		23-70-0100	LAMP NEON			
Q301		31-90-0080	FET DUAL			NEC UPA68H-M
Q304		30-30-9451	TR SI NPN			NEC 2SC945-Q
Q305		30-30-9451	TR SI NPN			NEC 2SC945-Q
Q306		30-30-9451	TR SI NPN			NEC 2SC945-Q
Q307		30-30-9451	TR SI NPN			NEC 2SC945-Q
Q308		30-30-9451	TR SI NPN			NEC 2SC945-Q
Q309		30-20-6481	TR SI PNP			HITACHI 2SB648A
Q310		30-40-6681	TR SI NPN			HITACHI 2SD668A-C
Q311		30-40-6681	TR SI NPN			HITACHI 2SD668A-C
Q312		30-20-6481	TR SI PNP			HITACHI 2SB648A
Q401		30-40-8802	TR SI NPN			TOSHIBA 2SD880-Y

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION					COS1610	
Q431		30-32-7041	TR SI NPN					TOSHIBA	2SC2704-O
QCR301		30-31-9071	TR SI NPN					HITACHI	2SC1907
QCR302		30-31-9071	TR SI NPN					HITACHI	2SC1907
R303		42-83-5100	FXD M FILM	1M	OHM	1%	1/4W		
R304		42-83-5100	FXD M FILM	1M	OHM	1%	1/4W		
R305	*	42-83-4900	FXD M FILM	900K	OHM	1%	1/4W		
R306	*	42-83-4900	FXD M FILM	900K	OHM	1%	1/4W		
R309		40-27-1102	FXD C FILM	100	OHM	5%	1/4W		NAS1/4S
R310		40-27-1102	FXD C FILM	100	OHM	5%	1/4W		NAS1/4S
R311		40-27-2392	FXD C FILM	3.9K	OHM	5%	1/4W		
R312		40-27-2392	FXD C FILM	3.9K	OHM	5%	1/4W		
R313		40-27-2102	FXD C FILM	1K	OHM	5%	1/4W		NAS1/4S
R314		40-27-2332	FXD C FILM	3.3K	OHM	5%	1/4W		
R315		40-27-2332	FXD C FILM	3.3K	OHM	5%	1/4W		
R316		40-27-2392	FXD C FILM	3.9K	OHM	5%	1/4W		
R317		40-27-1822	FXD C FILM	820	OHM	5%	1/4W		
R318		40-27-2822	FXD C FILM	8.2K	OHM	5%	1/4W		
R320		40-27-1392	FXD C FILM	390	OHM	5%	1/4W		
R324		42-83-1470	FXD M FILM	470	OHM	1%	1/4W		
R325		40-27-2102	FXD C FILM	1K	OHM	5%	1/4W		NAS1/4S
R326		42-83-1470	FXD M FILM	470	OHM	1%	1/4W		
R327		40-27-3122	FXD C FILM	12K	OHM	5%	1/4W		
R328		40-27-3122	FXD C FILM	12K	OHM	5%	1/4W		
R331		42-83-1560	FXD M FILM	560	OHM	1%	1/4W		
R332		42-83-1560	FXD M FILM	560	OHM	1%	1/4W		
R333		40-27-0102	FXD C FILM	10	OHM	5%	1/4W		NAS1/4S
R334		40-27-0102	FXD C FILM	10	OHM	5%	1/4W		NAS1/4S
R336		40-27-0332	FXD C FILM	33	OHM	5%	1/4W		NAS1/4S
R337		40-27-1102	FXD C FILM	100	OHM	5%	1/4W		NAS1/4S
R338		40-27-2102	FXD C FILM	1K	OHM	5%	1/4W		NAS1/4S
R339		40-27-1332	FXD C FILM	330	OHM	5%	1/4W		
R340		40-27-1332	FXD C FILM	330	OHM	5%	1/4W		
R341		40-27-2102	FXD C FILM	1K	OHM	5%	1/4W		NAS1/4S
R342		40-27-2682	FXD C FILM	6.8K	OHM	5%	1/4W		
R343		42-34-2220	FXD M FILM	47	OHM	1%	1/2W		
R344		42-34-2220	FXD M FILM	47	OHM	1%	1/2W		
R345		40-27-2332	FXD C FILM	3.3K	OHM	5%	1/4W		
R346		40-27-2332	FXD C FILM	3.3K	OHM	5%	1/4W		
R347		40-27-4102	FXD C FILM	100K	OHM	5%	1/4W		
R348		40-27-4102	FXD C FILM	100K	OHM	5%	1/4W		
R349		40-27-2222	FXD C FILM	2.2K	OHM	5%	1/4W		
R350		40-27-2222	FXD C FILM	2.2K	OHM	5%	1/4W		
R351		40-27-1392	FXD C FILM	390	OHM	5%	1/4W		
R352		40-27-1392	FXD C FILM	390	OHM	5%	1/4W		
R401		40-27-2102	FXD C FILM	1K	OHM	5%	1/4W		NAS1/4S
R402		42-83-3680	FXD M FILM	68K	OHM	1%	1/4W		
R403		40-27-1272	FXD C FILM	270	OHM	5%	1/4W		
R404	*	40-27-4122	FXD C FILM	120K	OHM	5%	1/4W		
R405	*	42-83-2680	FXD M FILM	6.8K	OHM	1%	1/4W		RN1/4S
R406		42-83-2560	FXD M FILM	5.6K	OHM	1%	1/4W		
R407		40-27-1682	FXD C FILM	680	OHM	5%	1/4W		
R408	*	40-27-0332	FXD C FILM	33	OHM	5%	1/4W		NAS1/4S

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION	COS1610
R409		44-91-8101	FXD M OXIDE 1 OHM 5% 1W	MATSUSITA ERX1ANJ
R411		42-44-0330	FXD T FILM 10M OHM 1% 1W	
R412		42-44-0310	FXD M GLAZE 6.8M OHM 1% 1.6W	
R413		40-27-1102	FXD C FILM 100 OHM 5% 1/4W	NAS1/4S
R415		40-27-3102	FXD C FILM 10K OHM 5% 1/4W	
R416		40-37-6101	FXD C FILM 10M OHM 5% 1/2W	
R417		40-37-6101	FXD C FILM 10M OHM 5% 1/2W	
R418		40-27-1102	FXD C FILM 100 OHM 5% 1/4W	NAS1/4S
R419		40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W	
R423		40-37-6101	FXD C FILM 10M OHM 5% 1/2W	
R424		40-37-6101	FXD C FILM 10M OHM 5% 1/2W	
R425		40-27-5102	FXD C FILM 1M OHM 5% 1/4W	
R426		40-37-5221	FXD C FILM 2.2M OHM 5% 1/2W	
R427		40-27-2102	FXD C FILM 1K OHM 5% 1/4W	NAS1/4S
R431		40-27-3472	FXD C FILM 47K OHM 5% 1/4W	
R432		40-27-4472	FXD C FILM 470K OHM 5% 1/4W	
RV301		48-31-2500	VAR M GLAZE 5K OHM B PH	
RV303		48-31-3100	FXD M GLAZE 10K OHM B PH	
RV411		48-26-5221	VAR M GLAZE 2.2M OHM	
RV431		48-31-4100	VAR M GLAZE 100K OHM B PH	
T401		63-92-0160	DC-DC CON TRANS HV-3B	KIKUSUI S840732
U301		30-90-0141	TRANSISTOR ARRAYS 5 NPN	RCA CA3086
U401		34-00-0215	J-FET INPUT OPE-AMP	TEXAS INS. TL081CP

A3 ASSEMBLY

C501		52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1	
C502		52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1	
C503		54-80-1100	FXD ELECT 68MF 400WV	
C504		54-80-1030	FXD ELECT 1MF 450WV	
C505	*	50-67-0010	FXD PLSTC FILM 0.0022MF 10% 100WV	
C506		52-01-2305	FXD CER 470PF 10% 50V TYPE2	
C507		52-06-3225	FXD CER 100PF 10% 500V TYPE1	
C508	*	54-00-0114	FXD ELECT 47MF 25WV	
C509		54-00-0114	FXD ELECT 47MF 25WV	
C510		54-00-0114	FXD ELECT 47MF 25WV	
C531		54-30-1870	FXD ELECT 470MF 25WV	KM25VB470
C532		54-30-1870	FXD ELECT 470MF 25WV	KM25VB470
C533		54-60-1560	FXD ELECT 22MF 160WV	
C534		50-67-0030	FXD PLSTC FILM 0.01MF 10% 100WV	
C535		50-67-0030	FXD PLSTC FILM 0.01MF 10% 100WV	
CR501		32-90-2110	DIODE BRIGE VRM=400V IO=1A	TOSHIBA 1G4B42
CR502		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W	NEC RD5.6JB2
CR503		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA 1S1588
CR504		32-30-0830	DIODE VR=250V IO=200MA	HITACHI 1SS83
CR505		32-30-0830	DIODE VR=250V IO=200MA	HITACHI 1SS83
CR506		32-90-0550	DIODE VR=1KV IO=1A	HITACHI V11M
CR507		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA 1S1588

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION COS1610		
CR508		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR509		32-92-0033	ZENER VZ=3.2 - 3.4V	HITACHI	HZ3C-2
CR510		32-11-8350	DIODE VR=600V IO=1.0A	TOSHIBA	1S1835
CR531		32-11-8350	DIODE VR=600V IO=1.0A	TOSHIBA	1S1835
CR532		32-11-8350	DIODE VR=600V IO=1.0A	TOSHIBA	1S1835
CR533		32-92-0130	ZENER VZ=12.4-13.1V P=0.4W	NEC	RD13JB1
CR534		32-92-0130	ZENER VZ=12.4-13.1V P=0.4W	NEC	RD13JB1
CR535		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR536		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W	NEC	RD5.6JB2
CR537		32-90-0550	DIODE VR=1KV IO=1A	HITACHI	V11M
CR538		32-92-0182	ZENER VZ=17.5-18.4V P=0.4W	NEC	RD18JB2
CR539		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W	NEC	RD5.6JB2
CR540		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
L502		67-10-0890	INDUCTOR 100MH 10%		
L531		67-10-0900	INDUCTOR 470UH 10%		LAL04NA
PC501		37-30-0111	PHOT COUPLER	TOSHIBA	TLP521-1BL
PC502		37-30-0111	PHOT COUPLER	TOSHIBA	TLP521-1BL
Q501		30-32-8311	TR SI NPN (500V 1.5A 25W)		2SC2831
Q502		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q503		30-33-1480	TR SI NPN (800V 3A 40W)		2SC3148
Q504		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q505		30-11-0151	TR SI PNP	TOSHIBA	2SA1015-Y
Q506		30-11-0151	TR SI PNP	TOSHIBA	2SA1015-Y
Q507		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q508		30-10-9501	TR SI PNP HFE=160-320	TOSHIBA	2SA950-Y
Q531		30-20-8341	TR SI PNP	TOSHIBA	2SB834-Y
Q532		30-40-8802	TR SI NPN	TOSHIBA	2SD880-Y
Q533		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q534		30-30-9451	TR SI NPN	NEC	2SC945-Q
R502		43-58-0330	FXD WW 6.8 OHM 10% 3W		RGM2L
R503		44-91-4150	FXD M OXIDE 150K OHM 5% 1W	HOKURIKU	MOR1B
R504		44-92-2470	FXD MOR 4.7K OHM 5% 2W		
R505		40-27-3102	FXD C FILM 10K OHM 5% 1/4W		
R506		40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W		
R507	*	40-27-4102	FXD C FILM 100K OHM 5% 1/4W		
R508		40-27-1332	FXD C FILM 330 OHM 5% 1/4W		
R509		40-37-4471	FXD C FILM 470K OHM 5% 1/2W		
R510		40-27-1682	FXD C FILM 680 OHM 5% 1/4W		
R511		40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R512		44-91-8101	FXD M OXIDE 1 OHM 5% 1W	MATSUSITA	ERX1ANJ
R513		44-92-3100	FXD MOR 10K OHM 5% 2W		
R514		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R515		40-27-3472	FXD C FILM 47K OHM 5% 1/4W		
R516	*	40-27-2272	FXD C FILM 2.7K OHM 5% 1/4W		
R517		40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W		
R518		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R519		40-27-0472	FXD C FILM 47 OHM 5% 1/4W		NAS1/4S
R520	*	40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R521		40-27-0102	FXD C FILM 10 OHM 5% 1/4W		NAS1/4S
R522		40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W		

REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1610		
R523	40-27-0102	FXD C FILM 10	OHM 5% 1/4W		NAS1/4S
R531	40-27-0102	FXD C FILM 10	OHM 5% 1/4W		NAS1/4S
R532	40-27-0102	FXD C FILM 10	OHM 5% 1/4W		NAS1/4S
R533	40-27-1102	FXD C FILM 100	OHM 5% 1/4W		NAS1/4S
R534	40-27-1102	FXD C FILM 100	OHM 5% 1/4W		NAS1/4S
R535	44-92-1100	FXD M OXIDE 100	OHM 5% 2W	HOKURIKU	MOR2B
R536	44-92-1100	FXD M OXIDE 100	OHM 5% 2W	HOKURIKU	MOR2B
R537	40-27-2562	FXD C FILM 5.6K	OHM 5% 1/4W		
R538	42-83-3120	FXD M FILM 12K	OHM 1% 1/4W		
R539	42-83-3120	FXD M FILM 12K	OHM 1% 1/4W		
R540	40-27-2562	FXD C FILM 5.6K	OHM 5% 1/4W		
R541	40-27-2562	FXD C FILM 5.6K	OHM 5% 1/4W		
R542	40-27-8472	FXD C FILM 4.7	OHM 5% 1/4W		
R543	40-27-2152	FXD C FILM 1.5K	OHM 5% 1/4W		
R544	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W		NAS1/4S
R545	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W		NAS1/4S
R546	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W		NAS1/4S
R547	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W		NAS1/4S
R548	42-83-4120	FXD M FILM 120K	OHM 1% 1/4W		
R549	42-83-2560	FXD M FILM 5.6K	OHM 1% 1/4W		
R551	40-27-1152	FXD C FILM 150	OHM 5% 1/4W		
R552	40-27-1152	FXD C FILM 150	OHM 5% 1/4W		
R553	40-27-0000	JUMPER PARTS			NAS1/4
R554	40-27-3472	FXD C FILM 47K	OHM 5% 1/4W		
RT501	38-00-0120	THERMISTOR			8D13
RV531	48-33-2100	VAR M GLAZE 1K	OHM B	TEITSU	TM64K3(PV)
T501	63-94-1790	SWITCHING TRANS COS-1		KIKUSUI	S8406891
U501	35-60-0000	QUAD 2-INPUT NAND GATES		TOSHIBA	TC4011BP
U531	34-00-0240	DUAL OPE-AMP		NEC	UPC4558C
A4 ASSEMBLY					
C601	54-00-0114	FXD ELECT 47MF	25WV		
C602	54-60-1550	FXD ELECT 1MF	160WV		
CR601	37-00-0061	LAMP LED GREEN		TOSHIBA	TLG145
CR602	32-91-2300	ZENER VZ=135 - 165V P=1W		TOSHIBA	1Z150
R601	40-27-2152	FXD C FILM 1.5K	OHM 5% 1/4W		
RV601	46-16-3201	VAR M GLAZE 20K	OHM B 15S		RG161P
RV603	46-16-4101	VAR M GLAZE 100K	OHM B 15S		RG161P
RV604	46-16-3201	VAR M GLAZE 20K	OHM B 15S		RG161P
RV605	46-16-3201	VAR M GLAZE 20K	OHM B 15S		RG161P
S601	81-01-0270	PUSH SWITCH		ALPS	SDG5P-E
A5 ASSEMBLY					

REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1610		
RV701	48-32-2200	VAR M GLAZE 2K OHM B			
RV702	48-32-4100	VAR M GLAZE 100K OHM B		NOBLE	TM64K2(PV)
RV703	48-32-2200	VAR M GLAZE 2K OHM B			
RV704	48-32-2200	VAR M GLAZE 2K OHM B			
A7 ASSEMBLY					
C441	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C442	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C443	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C444	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C445	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C446	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C447	52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1			
C448	52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1			
C449	52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1			
CR441	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR442	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR443	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR444	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR445	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR446	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR447	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
R441	40-37-6101	FXD C FILM 10M OHM 5% 1/2W			
R442	40-37-3221	FXD C FILM 22K OHM 5% 1/2W			
B* ASSEMBLY					
FL611	99-20-0120	LINE FILTER		TOKIN	GL-2060F

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION	COS1611	
B ASSEMBLY					
F611		99-02-0001	FUSE 0.5A-250V S.B 5.2 X20		SD6
L411		66-21-0090	ROTATION COIL	S8401241	
V411		21-45-0600	CATHODE RAY TUBE	TOSHIBA	E8305B31
A1 ASSEMBLY					
C101		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C102		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C103		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C106		54-00-0114	FXD ELECT 47MF 25WV		
C107		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C109		54-60-1550	FXD ELECT 1MF 160WV		
C110		52-06-2265	FXD CER 220PF 10% 50V TYPE1		
C111		52-96-1120	CGM A 082 K G CON		
C112		52-96-1120	CGM A 082 K G CON		
C113		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C114		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C115		54-00-0311	FXD ELECT 10MF 50WV		
C116		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C117		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C118		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C119		54-00-0114	FXD ELECT 47MF 25WV		
C120		54-00-0114	FXD ELECT 47MF 25WV		
C121		52-06-2225	FXD CER 100PF 10% 50V TYPE1		
C122		52-06-2225	FXD CER 100PF 10% 50V TYPE1		
C201		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C202		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C203		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C206		54-00-0114	FXD ELECT 47MF 25WV		
C207		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C208		52-06-2010	FXD CER 1PF 10% 50V TYPE1		
C209		54-60-1550	FXD ELECT 1MF 160WV		
C210	*	52-06-2274	FXD CER 270P 10% 50V TYPE1		
C211		52-96-1120	CGM A 082 K G CON		
C212		52-96-1120	CGM A 082 K G CON		
C213		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C214		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C215		54-00-0311	FXD ELECT 10MF 50WV		
C216		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C217		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C218		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C219		54-00-0114	FXD ELECT 47MF 25WV		
CR101		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR102		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR103		32-92-0082	ZENER VZ=7.7 -8.7 V P=0.4W	NEC	RD8.2JB

REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1611	
CR201	32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR202	32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR203	32-92-0082	ZENER VZ=7.7 -8.7 V P=0.4W	NEC	RD8.2JB
CV103	57-10-1270	CER TRIM CTZ53C 3-10PF		
CV203	57-10-1270	CER TRIM CTZ53C 3-10PF		
Q101	31-90-0080	FET DUAL	NEC	UPA68H-M
Q102	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q103	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q104	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q105	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q106	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q107	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q108	30-31-8431	TR SI NPN	NEC	2SC1843-E
Q109	30-20-6481	TR SI PNP	HITACHI	2SB648A
Q110	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q111	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q112	30-20-6481	TR SI PNP	HITACHI	2SB648A
Q201	31-90-0080	FET DUAL	NEC	UPA68H-M
Q205	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q206	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q207	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q208	30-30-9451	TR SI NPN	NEC	2SC945-Q
Q209	30-20-6481	TR SI PNP	HITACHI	2SB648A
Q210	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q211	30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q212	30-20-6481	TR SI PNP	HITACHI	2SB648A
QCR101	30-31-9071	TR SI NPN	HITACHI	2SC1907
QCR102	30-31-9071	TR SI NPN	HITACHI	2SC1907
QCR201	30-31-9071	TR SI NPN	HITACHI	2SC1907
QCR202	30-31-9071	TR SI NPN	HITACHI	2SC1907
R103	42-83-5100	FXD M FILM 1M OHM 1% 1/4W		
R104	42-83-5100	FXD M FILM 1M OHM 1% 1/4W		
R105	42-83-4900	FXD M FILM 900K OHM 1% 1/4W		
R106	42-83-4900	FXD M FILM 900K OHM 1% 1/4W		
R109	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R110	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R111	40-27-2392	FXD C FILM 3.9K OHM 5% 1/4W		
R112	40-27-2392	FXD C FILM 3.9K OHM 5% 1/4W		
R113	40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R114	40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W		
R115	40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W		
R116	40-27-2392	FXD C FILM 3.9K OHM 5% 1/4W		
R117	40-27-1822	FXD C FILM 820 OHM 5% 1/4W		
R118	40-27-2822	FXD C FILM 8.2K OHM 5% 1/4W		
R119	40-27-0332	FXD C FILM 33 OHM 5% 1/4W		NAS1/4S
R120	40-27-1392	FXD C FILM 390 OHM 5% 1/4W		
R121	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R122	40-27-1102	FXD C FILM 100 OHM 5% 1/4W		NAS1/4S
R123	40-27-0332	FXD C FILM 33 OHM 5% 1/4W		NAS1/4S
R124	42-83-1680	FXD M FILM 680 OHM 1% 1/4W		

REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1611	
R125	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R126	42-83-1680	FXD M FILM 680	OHM 1% 1/4W	
R127	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R128	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R131	42-83-1560	FXD M FILM 560	OHM 1% 1/4W	
R132	42-83-1560	FXD M FILM 560	OHM 1% 1/4W	
R133	40-27-0102	FXD C FILM 10	OHM 5% 1/4W	NAS1/4S
R134	40-27-0102	FXD C FILM 10	OHM 5% 1/4W	NAS1/4S
R135	40-27-3152	FXD C FILM 15K	OHM 5% 1/4W	
R136	40-27-1562	FXD C FILM 560	OHM 5% 1/4W	
R137	40-27-3222	FXD C FILM 22K	OHM 5% 1/4W	
R138	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R139	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R140	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R141	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R142	40-27-2682	FXD C FILM 6.8K	OHM 5% 1/4W	
R143	42-34-2220	FXD M FILM 47	OHM 1% 1/2W	
R144	42-34-2220	FXD M FILM 47	OHM 1% 1/2W	
R145	40-27-2122	FXD C FILM 1.2K	OHM 5% 1/4W	
R146	40-27-2122	FXD C FILM 1.2K	OHM 5% 1/4W	
R147	40-27-4102	FXD C FILM 100K	OHM 5% 1/4W	
R148	40-27-4102	FXD C FILM 100K	OHM 5% 1/4W	
R149	40-27-2222	FXD C FILM 2.2K	OHM 5% 1/4W	
R150	40-27-2222	FXD C FILM 2.2K	OHM 5% 1/4W	
R151	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R152	40-27-1272	FXD C FILM 270	OHM 5% 1/4W	
R153	40-27-0222	FXD C FILM 22	OHM 5% 1/4W	NAS1/4S
R154	40-27-0222	FXD C FILM 22	OHM 5% 1/4W	NAS1/4S
R203	42-83-5100	FXD M FILM 1M	OHM 1% 1/4W	
R204	42-83-5100	FXD M FILM 1M	OHM 1% 1/4W	
R205	42-83-4900	FXD M FILM 900K	OHM 1% 1/4W	
R206	42-83-4900	FXD M FILM 900K	OHM 1% 1/4W	
R209	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R210	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R211	40-27-2392	FXD C FILM 3.9K	OHM 5% 1/4W	
R212	40-27-2392	FXD C FILM 3.9K	OHM 5% 1/4W	
R213	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R214	40-27-2332	FXD C FILM 3.3K	OHM 5% 1/4W	
R215	40-27-2332	FXD C FILM 3.3K	OHM 5% 1/4W	
R216	40-27-2392	FXD C FILM 3.9K	OHM 5% 1/4W	
R217	40-27-1822	FXD C FILM 820	OHM 5% 1/4W	
R218	40-27-2822	FXD C FILM 8.2K	OHM 5% 1/4W	
R219	40-27-0332	FXD C FILM 33	OHM 5% 1/4W	NAS1/4S
R220	40-27-1392	FXD C FILM 390	OHM 5% 1/4W	
R221	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R222	40-27-1102	FXD C FILM 100	OHM 5% 1/4W	NAS1/4S
R223	40-27-0332	FXD C FILM 33	OHM 5% 1/4W	NAS1/4S
R224	42-83-1330	FXD M FILM 330	OHM 1% 1/4W	
R225	40-27-2102	FXD C FILM 1K	OHM 5% 1/4W	NAS1/4S
R226	42-83-1330	FXD M FILM 330	OHM 1% 1/4W	
R227	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R228	40-27-3102	FXD C FILM 10K	OHM 5% 1/4W	
R229	40-27-2822	FXD C FILM 8.2K	OHM 5% 1/4W	
R230	40-27-3332	FXD C FILM 33K	OHM 5% 1/4W	

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION	COS1611	
R231		42-83-1560	FXD M FILM 560 OHM 1% 1/4W		
R232		42-83-1560	FXD M FILM 560 OHM 1% 1/4W		
R233		40-27-0102	FXD C FILM 10 OHM 5% 1/4W		NAS1/4S
R234		40-27-0102	FXD C FILM 10 OHM 5% 1/4W		NAS1/4S
R238		40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R239		40-27-1332	FXD C FILM 330 OHM 5% 1/4W		
R240		40-27-1332	FXD C FILM 330 OHM 5% 1/4W		
R241		40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R242		40-27-2682	FXD C FILM 6.8K OHM 5% 1/4W		
R243		42-34-2220	FXD M FILM 47 OHM 1% 1/2W		
R244		42-34-2220	FXD M FILM 47 OHM 1% 1/2W		
R245		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R246		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R247		40-27-4102	FXD C FILM 100K OHM 5% 1/4W		
R248		40-27-4102	FXD C FILM 100K OHM 5% 1/4W		
R249		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R250		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R251		40-27-1392	FXD C FILM 390 OHM 5% 1/4W		
R252		40-27-1392	FXD C FILM 390 OHM 5% 1/4W		
RV101		48-31-1500	VAR M GLAZE 500 OHM B PH		
RV102		48-31-2100	VAR M GLAZE 1K OHM B PH		
RV103		48-31-3100	FXD M GLAZE 10K OHM B PH		
RV201		48-31-1500	VAR M GLAZE 500 OHM B PH		
RV203		48-31-3100	FXD M GLAZE 10K OHM B PH		
U101		30-90-0141	TRANSISTOR ARRAYS 5 NPN	RCA	CA3086
U201		30-90-0141	TRANSISTOR ARRAYS 5 NPN	RCA	CA3086
A2 ASSEMBLY					
C301		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C302		50-67-0040	FXD PLSTC FILM 0.022MF 10% 100WV		
C303		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C306		54-00-0114	FXD ELECT 47MF 25WV		
C307		52-05-1498	FXD CER 0.1UF +80-20% 25V TYPE2		
C309		54-60-1550	FXD ELECT 1MF 160WV		
C311		52-96-1120	CGM A 082 K G CON		
C312		52-96-1120	CGM A 082 K G CON		
C313		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C314		52-01-3385	FXD CER 2220PF 10% 500V TYPE2		
C315		54-00-0311	FXD ELECT 10MF 50WV		
C316		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C317		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C318		50-77-3500	FXD PLSTC FILM 0.047MF 20% 250WV		
C319		54-00-0311	FXD ELECT 10MF 50WV		
C320		54-00-0311	FXD ELECT 10MF 50WV		
C401		55-37-2050	FXD TANT ELECT 1UF 35V		
C402		50-67-0020	FXD PLSTC FILM 0.0047MF 10% 100WV		
C403		50-67-0050	FXD PLSTC FILM 0.047MF 10% 100WV		
C404	*	54-00-0114	FXD ELECT 47MF 25WV		
C405		54-00-0114	FXD ELECT 47MF 25WV		

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION COS1611		
C411		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C412		52-08-5145	FXD CER 22PF 10% 2KV TYPE1		
C413		52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1		
C414		52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1		
C415		52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1		
C416		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C417		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C418		52-03-3469	FXD CER 0.01UF +100-0% 500V TYPE2		
C419		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C420		52-03-3469	FXD CER 0.01UF +100-0% 500V TYPE2		
C421		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C422		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C423		52-98-1020	FXD CER 1000PF +80 - -20% 3.15KV		
C424		52-96-1170	FXD CER 5PF 1KV		
C425		52-96-1170	FXD CER 5PF 1KV		
C431		52-03-3469	FXD CER 0.01UF +100-0% 500V TYPE2		
C432		52-03-3469	FXD CER 0.01UF +100-0% 500V TYPE2		
CR301		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR302		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR303		32-92-0082	ZENER VZ=7.7 -8.7 V P=0.4W	NEC	RD8.2JB
CR401		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR402		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W	NEC	RD5.6JB2
CR403		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR404		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR411		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR412		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR413		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR414		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR415		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR416		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR417		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
CR418		32-90-1820	DIODE VR=2KV FAST RECOVERY	HITACHI	ERB26-20
CR419	*	32-92-0062	ZENER VZ=5.8 - 6.6V P=0.4W	NEC	RD6.2JB
CV303		57-10-1270	CER TRIM CTZ53C 3-10PF		
L401		67-10-0890	INDUCTOR 100MH 10%		
PL411		23-70-0100	LAMP NEON		
PL412		23-70-0100	LAMP NEON		
PL413		23-70-0100	LAMP NEON		
Q301		31-90-0080	FET DUAL	NEC	UPA68H-M
Q304		30-30-9451	TR SI NPN	NEC	2SC945-Q
Q305		30-30-9451	TR SI NPN	NEC	2SC945-Q
Q306		30-30-9451	TR SI NPN	NEC	2SC945-Q
Q307		30-30-9451	TR SI NPN	NEC	2SC945-Q
Q308		30-30-9451	TR SI NPN	NEC	2SC945-Q
Q309		30-20-6481	TR SI PNP	HITACHI	2SB648A
Q310		30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q311		30-40-6681	TR SI NPN	HITACHI	2SD668A-C
Q312		30-20-6481	TR SI PNP	HITACHI	2SB648A
Q401		30-40-8802	TR SI NPN	TOSHIBA	2SD880-Y

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION				COS1611	
Q431		30-32-7041	TR SI NPN				TOSHIBA	2SC2704-0
QCR301		30-31-9071	TR SI NPN				HITACHI	2SC1907
QCR302		30-31-9071	TR SI NPN				HITACHI	2SC1907
R303		42-83-5100	FXD M FILM	1M	OHM 1%	1/4W		
R304		42-83-5100	FXD M FILM	1M	OHM 1%	1/4W		
R305	*	42-83-4900	FXD M FILM	900K	OHM 1%	1/4W		
R306	*	42-83-4900	FXD M FILM	900K	OHM 1%	1/4W		
R309		40-27-1102	FXD C FILM	100	OHM 5%	1/4W		NAS1/4S
R310		40-27-1102	FXD C FILM	100	OHM 5%	1/4W		NAS1/4S
R311		40-27-2392	FXD C FILM	3.9K	OHM 5%	1/4W		
R312		40-27-2392	FXD C FILM	3.9K	OHM 5%	1/4W		
R313		40-27-2102	FXD C FILM	1K	OHM 5%	1/4W		NAS1/4S
R314		40-27-2332	FXD C FILM	3.3K	OHM 5%	1/4W		
R315		40-27-2332	FXD C FILM	3.3K	OHM 5%	1/4W		
R316		40-27-2392	FXD C FILM	3.9K	OHM 5%	1/4W		
R317		40-27-1822	FXD C FILM	820	OHM 5%	1/4W		
R318		40-27-2822	FXD C FILM	8.2K	OHM 5%	1/4W		
R320		40-27-1392	FXD C FILM	390	OHM 5%	1/4W		
R324		42-83-1470	FXD M FILM	470	OHM 1%	1/4W		
R325		40-27-2102	FXD C FILM	1K	OHM 5%	1/4W		NAS1/4S
R326		42-83-1470	FXD M FILM	470	OHM 1%	1/4W		
R327		40-27-3122	FXD C FILM	12K	OHM 5%	1/4W		
R328		40-27-3122	FXD C FILM	12K	OHM 5%	1/4W		
R331		42-83-1560	FXD M FILM	560	OHM 1%	1/4W		
R332		42-83-1560	FXD M FILM	560	OHM 1%	1/4W		
R333		40-27-0102	FXD C FILM	10	OHM 5%	1/4W		NAS1/4S
R334		40-27-0102	FXD C FILM	10	OHM 5%	1/4W		NAS1/4S
R336		40-27-0332	FXD C FILM	33	OHM 5%	1/4W		NAS1/4S
R337		40-27-1102	FXD C FILM	100	OHM 5%	1/4W		NAS1/4S
R338		40-27-2102	FXD C FILM	1K	OHM 5%	1/4W		NAS1/4S
R339		40-27-1332	FXD C FILM	330	OHM 5%	1/4W		
R340		40-27-1332	FXD C FILM	330	OHM 5%	1/4W		
R341		40-27-2102	FXD C FILM	1K	OHM 5%	1/4W		NAS1/4S
R342		40-27-2682	FXD C FILM	6.8K	OHM 5%	1/4W		
R343		42-34-2220	FXD M FILM	47	OHM 1%	1/2W		
R344		42-34-2220	FXD M FILM	47	OHM 1%	1/2W		
R345		40-27-2332	FXD C FILM	3.3K	OHM 5%	1/4W		
R346		40-27-2332	FXD C FILM	3.3K	OHM 5%	1/4W		
R347		40-27-4102	FXD C FILM	100K	OHM 5%	1/4W		
R348		40-27-4102	FXD C FILM	100K	OHM 5%	1/4W		
R349		40-27-2222	FXD C FILM	2.2K	OHM 5%	1/4W		
R350		40-27-2222	FXD C FILM	2.2K	OHM 5%	1/4W		
R351		40-27-1392	FXD C FILM	390	OHM 5%	1/4W		
R352		40-27-1392	FXD C FILM	390	OHM 5%	1/4W		
R401		40-27-2102	FXD C FILM	1K	OHM 5%	1/4W		NAS1/4S
R402		42-83-3680	FXD M FILM	68K	OHM 1%	1/4W		
R403		40-27-1272	FXD C FILM	270	OHM 5%	1/4W		
R404	*	40-27-4122	FXD C FILM	120K	OHM 5%	1/4W		
R405	*	42-83-2680	FXD M FILM	6.8K	OHM 1%	1/4W		RN1/4S
R406		42-83-2560	FXD M FILM	5.6K	OHM 1%	1/4W		
R407		40-27-1682	FXD C FILM	680	OHM 5%	1/4W		
R408	*	40-27-0332	FXD C FILM	33	OHM 5%	1/4W		NAS1/4S

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION	COS1611		
R409		44-91-8101	FXD M OXIDE 1	OHM 5% 1W	MATSUSITA	ERX1ANJ
R411		42-44-0330	FXD T FILM 10M	OHM 1% 1W		
R412		42-44-0310	FXD M GLAZE 6.8M	OHM 1% 1.6W		
R413		40-27-1102	FXD C FILM 100	OHM 5% 1/4W		NAS1/4S
R415		40-27-3102	FXD C FILM 10K	OHM 5% 1/4W		
R416		40-37-6101	FXD C FILM 10M	OHM 5% 1/2W		
R417		40-37-6101	FXD C FILM 10M	OHM 5% 1/2W		
R418		40-27-1102	FXD C FILM 100	OHM 5% 1/4W		NAS1/4S
R419		40-27-2332	FXD C FILM 3.3K	OHM 5% 1/4W		
R423		40-37-6101	FXD C FILM 10M	OHM 5% 1/2W		
R424		40-37-6101	FXD C FILM 10M	OHM 5% 1/2W		
R425		40-27-5102	FXD C FILM 1M	OHM 5% 1/4W		
R426		40-37-5221	FXD C FILM 2.2M	OHM 5% 1/2W		
R427		40-27-2102	FXD C FILM 1K	OHM 5% 1/4W		NAS1/4S
R431		40-27-3472	FXD C FILM 47K	OHM 5% 1/4W		
R432		40-27-4472	FXD C FILM 470K	OHM 5% 1/4W		
RV301		48-31-2500	VAR M GLAZE 5K	OHM B PH		
RV303		48-31-3100	FXD M GLAZE 10K	OHM B PH		
RV411		48-26-5221	VAR M GLAZE 2.2M	OHM		
RV431		48-31-4100	VAR M GLAZE 100K	OHM B PH		
T401		63-92-0160	DC-DC CON TRANS HV-3B		KIKUSUI	S840732
U301		30-90-0141	TRANSISTOR ARRAYS 5 NPN		RCA	CA3086
U401		34-00-0215	J-FET INPUT OPE-AMP		TEXAS INS.	TL081CP

A3 ASSEMBLY

C501		52-98-1000	FXD CER 4700PF	+80-20% 3.15KV TYPE1		
C502		52-98-1000	FXD CER 4700PF	+80-20% 3.15KV TYPE1		
C503		54-80-1100	FXD ELECT 68MF	400WV		
C504		54-80-1030	FXD ELECT 1MF	450WV		
C505	*	50-67-0010	FXD PLSTC FILM	0.0022MF 10% 100WV		
C506		52-01-2305	FXD CER 470PF	10% 50V TYPE2		
C507		52-06-3225	FXD CER 100PF	10% 500V TYPE1		
C508	*	54-00-0114	FXD ELECT 47MF	25WV		
C509		54-00-0114	FXD ELECT 47MF	25WV		
C510		54-00-0114	FXD ELECT 47MF	25WV		
C531		54-30-1870	FXD ELECT 470MF	25WV		KM25VB470
C532		54-30-1870	FXD ELECT 470MF	25WV		KM25VB470
C533		54-60-1560	FXD ELECT 22MF	160WV		
C534		50-67-0030	FXD PLSTC FILM	0.01MF 10% 100WV		
C535		50-67-0030	FXD PLSTC FILM	0.01MF 10% 100WV		
CR501		32-90-2110	DIODE BRIGE VRM=400V	IO=1A	TOSHIBA	1G4B42
CR502		32-92-0056	ZENER VZ=5.5 - 5.8V	P=0.4W	NEC	RD5.6JB2
CR503		32-11-5880	DIODE VR=30V	IO=120MA	TOSHIBA	1S1588
CR504		32-30-0830	DIODE VR=250V	IO=200MA	HITACHI	1SS83
CR505		32-30-0830	DIODE VR=250V	IO=200MA	HITACHI	1SS83
CR506		32-90-0550	DIODE VR=1KV	IO=1A	HITACHI	V11M
CR507		32-11-5880	DIODE VR=30V	IO=120MA	TOSHIBA	1S1588

REFERENCE DESIGNATOR		KIKUSUI PARTS NO.	DESCRIPTION COS1611		
CR508		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR509		32-92-0033	ZENER VZ=3.2 - 3.4V	HITACHI	HZ3C-2
CR510		32-11-8350	DIODE VR=600V IO=1.0A	TOSHIBA	1S1835
CR531		32-11-8350	DIODE VR=600V IO=1.0A	TOSHIBA	1S1835
CR532		32-11-8350	DIODE VR=600V IO=1.0A	TOSHIBA	1S1835
CR533		32-92-0130	ZENER VZ=12.4-13.1V P=0.4W	NEC	RD13JB1
CR534		32-92-0130	ZENER VZ=12.4-13.1V P=0.4W	NEC	RD13JB1
CR535		32-11-5880	DIODE VR=30V IO=120MA	TOSHIBA	1S1588
CR536		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W	NEC	RD5.6JB2
CR537		32-90-0550	DIODE VR=1KV IO=1A	HITACHI	V11M
CR538		32-92-0182	ZENER VZ=17.5-18.4V P=0.4W	NEC	RD18JB2
CR539		32-92-0056	ZENER VZ=5.5 - 5.8V P=0.4W	NEC	RD5.6JB2
CR540		32-30-0830	DIODE VR=250V IO=200MA	HITACHI	1SS83
L502		67-10-0890	INDUCTOR 100MH 10%		
L531		67-10-0900	INDUCTOR 470UH 10%		LAL04NA
PC501		37-30-0111	PHOT COUPLER	TOSHIBA	TLP521-1BL
PC502		37-30-0111	PHOT COUPLER	TOSHIBA	TLP521-1BL
Q501		30-32-8311	TR SI NPN (500V 1.5A 25W)		2SC2831
Q502		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q503		30-33-1480	TR SI NPN (800V 3A 40W)		2SC3148
Q504		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q505		30-11-0151	TR SI PNP	TOSHIBA	2SA1015-Y
Q506		30-11-0151	TR SI PNP	TOSHIBA	2SA1015-Y
Q507		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q508		30-10-9501	TR SI PNP HFE=160-320	TOSHIBA	2SA950-Y
Q531		30-20-8341	TR SI PNP	TOSHIBA	2SB834-Y
Q532		30-40-8802	TR SI NPN	TOSHIBA	2SD880-Y
Q533		30-31-8151	TR SI NPN (50V 0.15A 0.4W)	TOSHIBA	2SC1815-Y
Q534		30-30-9451	TR SI NPN	NEC	2SC945-Q
R501		38-00-0120	THERMISTOR		8D13
R502		43-58-0330	FXD WW 6.8 OHM 10% 3W		RGM2L
R503		44-91-4150	FXD M OXIDE 150K OHM 5% 1W	HOKURIKU	MOR1B
R504		44-92-2470	FXD MOR 4.7K OHM 5% 2W		
R505		40-27-3102	FXD C FILM 10K OHM 5% 1/4W		
R506		40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W		
R507	*	40-27-4102	FXD C FILM 100K OHM 5% 1/4W		
R508		40-27-1332	FXD C FILM 330 OHM 5% 1/4W		
R509		40-37-4471	FXD C FILM 470K OHM 5% 1/2W		
R510		40-27-1682	FXD C FILM 680 OHM 5% 1/4W		
R511		40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R512		44-91-8101	FXD M OXIDE 1 OHM 5% 1W	MATSUSITA	ERX1ANJ
R513		44-92-3100	FXD MOR 10K OHM 5% 2W		
R514		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R515		40-27-3472	FXD C FILM 47K OHM 5% 1/4W		
R516	*	40-27-2272	FXD C FILM 2.7K OHM 5% 1/4W		
R517		40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W		
R518		40-27-2222	FXD C FILM 2.2K OHM 5% 1/4W		
R519		40-27-0472	FXD C FILM 47 OHM 5% 1/4W		NAS1/4S
R520	*	40-27-2102	FXD C FILM 1K OHM 5% 1/4W		NAS1/4S
R521		40-27-0102	FXD C FILM 10 OHM 5% 1/4W		NAS1/4S

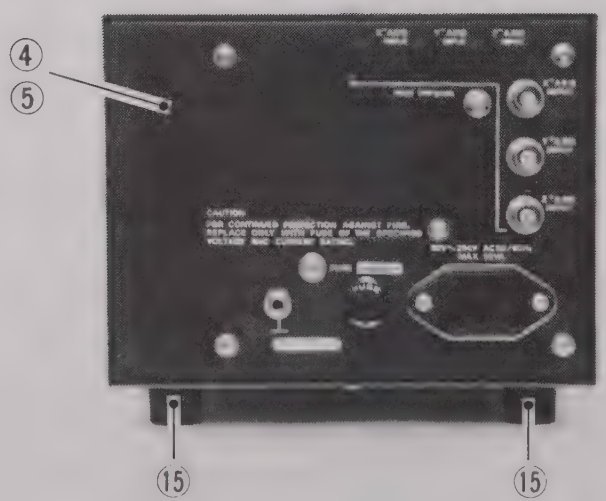
REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1611		
R522	40-27-2332	FXD C FILM 3.3K OHM 5% 1/4W			
R523	40-27-0102	FXD C FILM 10 OHM 5% 1/4W			NAS1/4S
R531	40-27-0102	FXD C FILM 10 OHM 5% 1/4W			NAS1/4S
R532	40-27-0102	FXD C FILM 10 OHM 5% 1/4W			NAS1/4S
R533	40-27-1102	FXD C FILM 100 OHM 5% 1/4W			NAS1/4S
R534	40-27-1102	FXD C FILM 100 OHM 5% 1/4W			NAS1/4S
R535	44-92-1100	FXD M OXIDE 100 OHM 5% 2W		HOKURIKU	MOR2B
R536	44-92-1100	FXD M OXIDE 100 OHM 5% 2W		HOKURIKU	MOR2B
R537	40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W			
R538	42-83-3120	FXD M FILM 12K OHM 1% 1/4W			
R539	42-83-3120	FXD M FILM 12K OHM 1% 1/4W			
R540	40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W			
R541	40-27-2562	FXD C FILM 5.6K OHM 5% 1/4W			
R542	40-27-8472	FXD C FILM 4.7 OHM 5% 1/4W			
R543	40-27-2152	FXD C FILM 1.5K OHM 5% 1/4W			
R544	40-27-2102	FXD C FILM 1K OHM 5% 1/4W			NAS1/4S
R545	40-27-2102	FXD C FILM 1K OHM 5% 1/4W			NAS1/4S
R546	40-27-2102	FXD C FILM 1K OHM 5% 1/4W			NAS1/4S
R547	40-27-2102	FXD C FILM 1K OHM 5% 1/4W			NAS1/4S
R548	42-83-4120	FXD M FILM 120K OHM 1% 1/4W			
R549	42-83-2560	FXD M FILM 5.6K OHM 1% 1/4W			
R551	40-27-1152	FXD C FILM 150 OHM 5% 1/4W			
R552	40-27-1152	FXD C FILM 150 OHM 5% 1/4W			
R553	40-27-0000	JUMPER PARTS			NAS1/4
R554	40-27-3472	FXD C FILM 47K OHM 5% 1/4W			
RV531	48-33-2100	VAR M GLAZE 1K OHM B		TEITSU	TM64K3(PV)
T501	63-94-1790	SWITCHING TRANS COS-1		KIKUSUI	S8406891
U501	35-60-0000	QUAD 2-INPUT NAND GATES		TOSHIBA	TC4011BP
U531	34-00-0240	DUAL OPE-AMP		NEC	UPC4558C
A4 ASSEMBLY					
C601	54-00-0114	FXD ELECT 47MF 25WV			
C602	54-60-1550	FXD ELECT 1MF 160WV			
CR601	37-00-0061	LAMP LED GREEN		TOSHIBA	TLG145
CR602	32-91-2300	ZENER VZ=135 - 165V P=1W		TOSHIBA	1Z150
R601	40-27-2152	FXD C FILM 1.5K OHM 5% 1/4W			
RV601	46-16-3201	VAR M GLAZE 20K OHM B 15S			RG161P
RV603	46-16-4101	VAR M GLAZE 100K OHM B 15S			RG161P
RV604	46-16-3201	VAR M GLAZE 20K OHM B 15S			RG161P
RV605	46-16-3201	VAR M GLAZE 20K OHM B 15S			RG161P
S601	81-01-0270	PUSH SWITCH		ALPS	SDG5P-E
A5 ASSEMBLY					

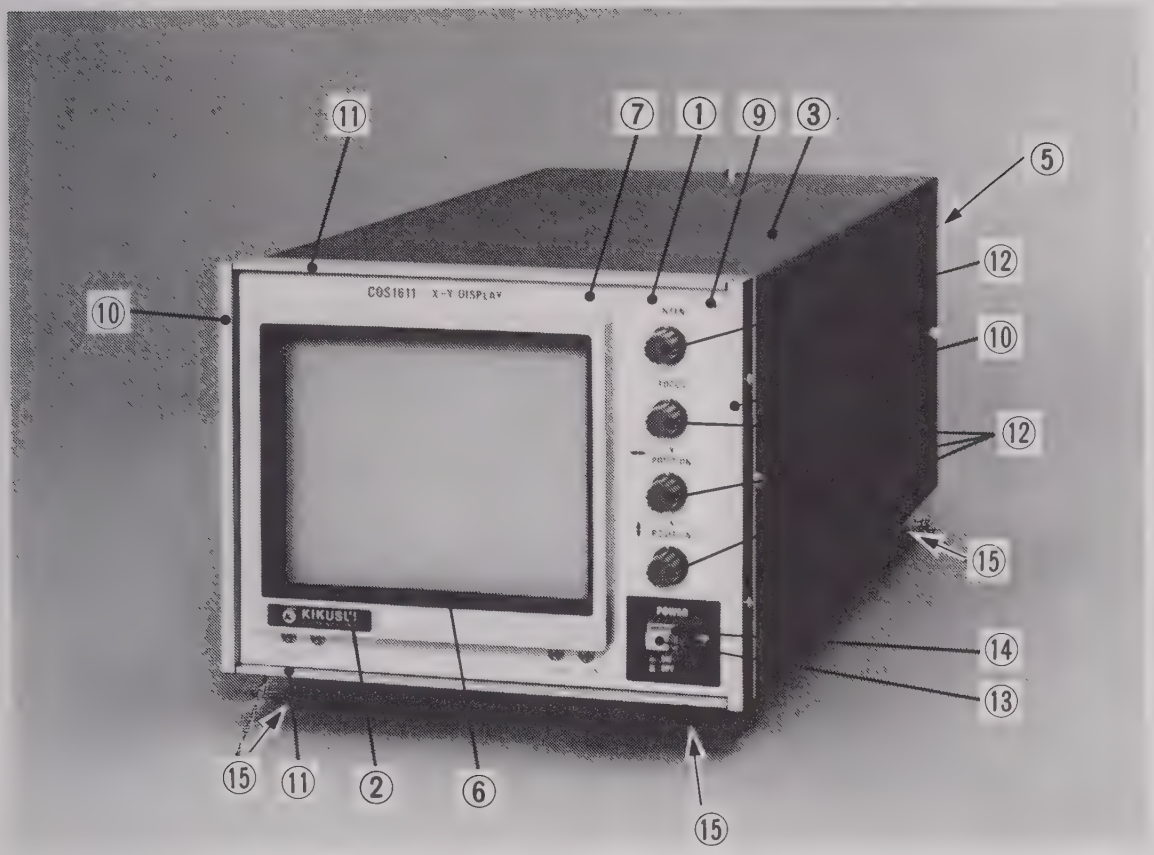
REFERENCE DESIGNATOR	KIKUSUI PARTS NO.	DESCRIPTION	COS1611		
RV701	48-32-2200	VAR M GLAZE 2K OHM B			
RV702	48-32-4100	VAR M GLAZE 100K OHM B		NOBLE	TM64K2(PV)
RV703	48-32-2200	VAR M GLAZE 2K OHM B			
RV704	48-32-2200	VAR M GLAZE 2K OHM B			
A7 ASSEMBLY					
C441	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C442	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C443	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C444	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C445	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C446	52-98-1010	FXD CER 1000PF +80-20% 6.3KV TYPE1			
C447	52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1			
C448	52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1			
C449	52-98-1000	FXD CER 4700PF +80-20% 3.15KV TYPE1			
CR441	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR442	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR443	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR444	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR445	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR446	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
CR447	32-90-1951	DIODE VR=6KV FAST RECOVERY		SANKEN	GHV-06SSN
R441	40-37-6101	FXD C FILM 10M OHM 5% 1/2W			
R442	40-37-3221	FXD C FILM 22K OHM 5% 1/2W			
B* ASSEMBLY					
FL611	99-20-0120	LINE FILTER		TOKIN	GL-2060F

4-7 Mechanical Parts

COS1610/1611

NO	CODE	DESCRIPTION	REMARK
1	A1-508-901	FRONT PANEL	COS1611 Only
2	A8-000-621	NAME PLATE (KIKUSUI)	
3	B1-508-901	CASE	
4	B6-508-801	REAR PLATE	REAR COS1610 Only
5	B6-508-901	REAR PLATE	REAR COS1611 Only
6	B9-050-141	BEZEL	
7	C1-508-801	SUB PANEL-1	BEHIND FRONT PANEL
8	C1-508-802	SIDE PLATE	
9	C1-508-901	SUB PANEL-2	BEHIND FRONT PANEL COS1611 Only
10	G1-508-601	FRAME H-133	COS1611 Only
11	G2-508-901	FRAME W-164	COS1611 Only
12	N1-001-401	KNOB R12SG-3.2 GRAY	
13	P2-000-331	PUSH BUTTON	
14	P2-000-331	PUSH BUTTON BEZEL	COS1611 Only
15	P2-000-381	FOOT (20-17)	BUTTOM COS 1611 Only
16	S3-508-801	SCALE	
17	S4-050-171	FILTER	

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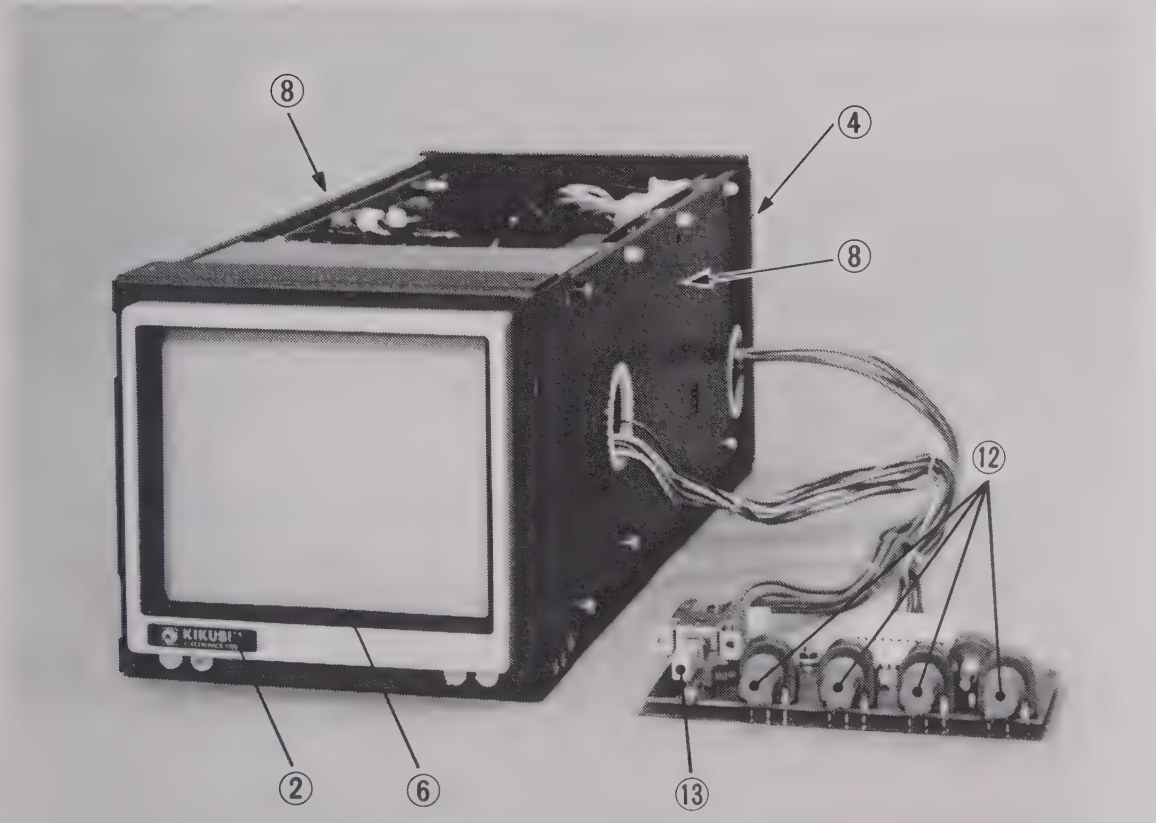
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KIKUSUI ELECTRONICS CORP.

3-1175, SHINMARUKO-HIGASHI, NAKAHARA-KU KAWASAKI-CITY, JAPAN
Telephone: (044) 411-0111～9 Telex: 3842678 KECJPN J Cable address: "KIKUSUIDE" KAWASAKI

MP MASTER
MA31421

KIKUSUI

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